Industrial Project III

LOUNGE CHAIR FOR HOME

Using cane as the primary material

Project Guide:

Professor Avinash Shnede

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M.Des Industrial Design 2023-2024
Roll no: 22M2233

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APPROVAL

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Is approved as a partial fulfilment of post graduate degree in Industrial Design.

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I declare that the content produced in this project report is an original piece of work. Adequate citations and references have been included along with the original sources wherever applicable.

I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea / data / fact / source in my submission.

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1.1 INTRODUCTION

A lounge chair is a piece of furniture designed for relax ation and comfort, typically featuring a reclined backrest, wide seat, and often, armrests. Unlike traditional upright chairs, lounge chairs are crafted with the intention of facilitating rest and leisure activities, such as reading, napping, or simply unwinding after a long day.

Lounge chairs are more than just functional pieces of furniture; they often serve as focal points within a space, adding character and style to any room. Their design can range from sleek and contemporary to ornate and traditional, allowing them to complement a wide range of interior decor themes. Beyond their aesthetic appeal, lounge chairs are engineered with ergonomics in mind, providing optimal support for the body's natural contours and promoting proper posture during extended periods of relaxation.

Whether chosen for their visual appeal, comfort, or practicality, lounge chairs hold a special place in the world of interior design, inviting individuals to unwind and rejuvenate in luxurious comfort.

Illustration 1: Lounge Chair Valencia
Source: Idorahome.com

1.1 TYPES OF LOUNGE CHAIR

Lounge chairs come in a variety of styles and designs, each catering to different preferences and needs. From classic chaise lounges ideal for luxurious relaxation to modern recliners offering customizable comfort, the diversity of lounge chairs is vast.

CHAISE LOUNGE CHAIR

It is a long, upholstered chair with a backrest at one end and a partial or no armrest, designed for reclining or lounging.

Originating from the French term “chaise lounge,” meaning “long chair,” this iconic piece of furniture features an elongated seat, perfect for reclining and stretching out in style. The chaise lounge exudes sophistication with its graceful curves, plush upholstery, and often adorned with decorative details like tufting or intricate carvings. Whether positioned poolside for soaking up the sun or nestled in a cozy corner of a living room, the chaise lounge adds a touch of opulence to any space while offering a sanctuary for lounging, reading, or daydreaming. Its versatility allows it to seamlessly blend into both traditional and contemporary interiors, making it a cherished staple in homes, hotels, and resorts alike. As a symbol of leisure and refinement, the chaise lounge chair continues to captivate with its allure, inviting individuals to indulge in moments of relaxation and serenity.

Illustration 2: Blake Tufted Chaise by Ave Six - Office Star
Source: madisonseating.com

ARM CHAIR

A comfortable chair with side arms and a backrest, often upholstered, providing ample support for lounging.

The armchair stands as a timeless emblem of comfort and sophistication in the realm of furniture design. With its enveloping embrace and sturdy armrests, it offers a haven of relaxation and support. From classic wingback designs exuding traditional elegance to sleek modern interpretations, armchairs come in a myriad of styles to suit diverse tastes and interior décors. Whether adorned with luxurious upholstery or crafted from rich wood, each armchair boasts its own unique charm, inviting individuals to unwind and luxuriate in its plush embrace.

Beyond its aesthetic appeal, the armchair serves as a versatile piece of furniture, seamlessly transitioning from a cozy reading nook to a stylish accent piece in a living room or study. With its blend of comfort, style, and functionality, the armchair remains an enduring symbol of comfort and refinement in homes and spaces around

Illustration 3: MONTE LOUNGE CHAIR GREY/BLACK
Source: Concepto

CLUB CHAIR

It is a plush, upholstered chair with a deep seat and armrests, typically associated with a cozy, inviting feel.

With its distinguished silhouette and inviting presence, exudes an air of refined comfort and timeless elegance. Originally crafted for exclusive gentlemen's clubs in 19th-century England, this iconic piece of furniture has since transcended its origins to become a beloved staple in homes and lounges worldwide. Characterized by its plush upholstery, generous proportions, and enveloping armrests, the club chair beckons with an irresistible allure, promising moments of relaxation and repose. Whether upholstered in supple leather for a classic look or adorned with fabric for a touch of texture, each club chair embodies a sense of sophistication and luxury.

From intimate reading corners to grand living spaces, the club chair adds a touch of understated glamour while providing a cozy sanctuary for lounging, conversing, or simply savoring moments of leisure. As a symbol of refined comfort and timeless style, the club chair continues to captivate with its enduring appeal, inviting individuals to unwind and indulge in moments of relaxation and camaraderie.

Illustration 4: Cuddle 1 Seater Armchair
Source: fantasticfurniture.com

ADIRONDACK CHAIR

A classic outdoor lounge chair characterized by its slanted seat and wide armrests, often made from wood or plastic.

The Adirondack chair embodies the spirit of rustic relaxation and outdoor leisure. Originating in the Adirondack Mountains of upstate New York, this iconic chair is renowned for its distinctive slanted seat and wide armrests, designed for optimal comfort and relaxation. Crafted from sturdy wood or durable plastic, Adirondack chairs are built to withstand the elements, making them a beloved choice for outdoor lounging on patios, decks, and gardens. With their timeless charm and enduring appeal, Adirondack chairs invite individuals to unwind and savor the simple pleasures of outdoor living, whether basking in the warm sunshine or gazing at starlit skies.

As a symbol of laid-back luxury and rustic charm, the Adirondack chair remains a beloved fixture in outdoor spaces, inviting moments of relaxation and tranquility amidst the beauty of nature.

Illustration 5: Nags Read head Hammocks
Source: Pawleys Island Hammocks

EGG CHAIR

A distinctive, cocoon-shaped chair designed for relaxation, featuring a curved backrest and often accompanied by a footrest.

The egg chair, a design icon of mid-century modernism, encapsulates both whimsy and comfort in its distinctive form. Shaped like a cocoon with its curved backrest and enclosing sides, the egg chair provides a cozy retreat within any space. Originally conceived by Danish designer Arne Jacobsen in 1958, its innovative design has since become synonymous with retro-chic style. Whether upholstered in vibrant fabrics or sleek leather, the egg chair adds a playful yet sophisticated touch to interiors, instantly becoming a focal point of conversation.

Its enveloping structure offers a sense of privacy and relaxation, making it an ideal choice for lounging, reading, or simply unwinding after a long day. With its timeless appeal and sculptural presence, the egg chair continues to captivate design enthusiasts, inviting them to indulge in moments of comfort and style.

Illustration 6: Egg chair
Source: muebledesign.com

WINGBACK CHAIR

A traditional chair with “wings” protruding from the back, providing support for the head and shoulders, and often upholstered for added comfort.

The wingback chair, with its graceful silhouette and distinctive wings extending from the backrest, is a classic symbol of comfort and elegance. Originating in 17th-century England, this iconic piece of furniture was designed to shield its occupant from drafts and provide a cozy retreat by the fireplace. Over the centuries, the wingback chair has evolved into a timeless furniture staple, cherished for its timeless appeal and versatility. Whether upholstered in sumptuous fabrics or adorned with intricate details, such as button tufting or nailhead trim, the wingback chair adds a touch of sophistication to any interior space.

With its enveloping design and supportive structure, it invites individuals to relax and unwind in style, making it a cherished addition to living rooms, studies, and libraries alike. As a symbol of refined comfort and timeless elegance, the wingback chair continues to captivate with its enduring charm and grace.

Illustration 7: Styled Wingback Fabric Chair - 1036BU-1
Source: Cohens

RECLINER CHAIR

A lounge chair with a mechanism that allows the back-rest to recline backward and the footrest to extend, offering customizable levels of comfort for sitting or reclining.

The egg chair, a design icon of mid-century modern-ism, encapsulates both whimsy and comfort in its distinctive form. Shaped like a cocoon with its curved backrest and enclosing sides, the egg chair provides a cozy retreat within any space. Originally conceived by Danish designer Arne Jacobsen in 1958, its innovative design has since become synonymous with retro-chic style. Whether upholstered in vibrant fabrics or sleek leather, the egg chair adds a playful yet sophisticated touch to interiors, instantly becoming a focal point of conversation.

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Illustration 8: Helios Fabric 1 Seater Motorized Recliner Chair
Source: woodenstreet.com

ROCKING CHAIR

A chair mounted on curved legs that allow it to rock back and forth, providing a soothing motion conducive to relaxation.

The rocking chair, with its gentle swaying motion, evokes a sense of tranquility and relaxation, making it a beloved fixture in homes around the world. Originating in the early 18th century, this timeless piece of furniture has remained a symbol of comfort and nostalgia. Crafted from wood, metal, or even modern materials like plastic, the rocking chair offers a soothing escape from the stresses of everyday life. Whether placed on a porch, in a nursery, or beside a cozy fireplace, its rhythmic motion lulls individuals into a state of peaceful serenity, making it an ideal spot for reading, knitting, or simply enjoying moments of quiet reflection.

With its enduring charm and timeless appeal, the rocking chair continues to captivate hearts and minds, inviting individuals of all ages to unwind and embrace the simple pleasures of rocking gently back and forth.

Illustration 9: Rocking Chair Manhattan Grey Beige
Source: myconcept.com.hk

SWIVEL CHAIR

A chair that can rotate 360 degrees on a central axis, offering flexibility and ease of movement for lounging or socializing.

The swivel lounge chair represents the epitome of versatility and modern comfort in furniture design. With its ability to rotate a full 360 degrees on a central axis, this innovative chair offers unparalleled flexibility and ease of movement. Whether upholstered in luxurious fabrics or sleek leather, the swivel lounge chair seamlessly blends style with functionality, making it a chic addition to any contemporary living space. Its swiveling motion allows individuals to effortlessly pivot and turn, whether engaging in conversation with friends or simply enjoying the panoramic view of their surroundings.

From home offices to entertainment areas, the swivel lounge chair brings a touch of sophistication and dynamic flair, inviting users to lounge in style while effortlessly navigating their environment.

Illustration 10: Wool Fabric Tilt Swivel chair
Source: Pacerperformance

BEAN BAG CHAIR

A casual lounge chair filled with small polystyrene beads or similar material, conforming to the body's shape for a relaxed seating experience.

The beanbag lounge chair embodies casual comfort and relaxed style, offering a unique seating experience that conforms to the body's contours. Filled with small polystyrene beads or similar materials, the beanbag chair molds to the shape of the user, providing a cozy and customizable seating option. Whether lounging in a living room, bedroom, or recreational space, its lightweight design allows for easy mobility, making it a versatile choice for any setting. Available in a variety of sizes, shapes, and colors, beanbag chairs cater to individual preferences and interior aesthetics, adding a playful touch to contemporary decor.

As a symbol of laid-back luxury, the beanbag lounge chair invites individuals to sink in, unwind, and embrace moments of leisure in ultimate comfort.

Illustration 11: Couchette® Bellisimo Lounge Sofa Bean Bag
Source: Amazon.com

BARCELONA CHAIR

A modern classic, originally designed by Ludwig Mies van der Rohe and Lilly Reich, characterized by a sleek stainless steel frame and leather upholstery. It exudes timeless elegance and comfort, making it a staple in contemporary lounge spaces.

The Barcelona lounge chair stands as a timeless masterpiece of modern design, celebrated for its sleek lines, minimalist elegance, and unparalleled comfort. Originally created by legendary architects Ludwig Mies van der Rohe and Lilly Reich for the German Pavilion at the 1929 International Exposition in Barcelona, Spain, this iconic chair has become synonymous with contemporary luxury. Crafted with a stainless steel frame and sumptuous leather upholstery, the Barcelona chair exudes sophistication and refinement, making it a coveted centerpiece in stylish interiors around the world. Its distinctive profile and meticulous craftsmanship reflect a harmonious fusion of form and function, inviting individuals to relax and recline in unparalleled style.

As a symbol of enduring sophistication and architectural brilliance, the Barcelona lounge chair continues to captivate admirers with its timeless allure and understated glamour.

Illustration 12: Barcelona® Chair
Source: knoll-int.com

1.3 RATTAN (CANE) AS A PRIMARY MATERIAL

Rattan, a natural material renowned for its versatility, durability, and timeless charm, has long been celebrated in the realm of furniture craftsmanship. Derived from the climbing palms of the Calamus species, rattan boasts a remarkable combination of strength and flexibility, making it an ideal choice for a wide range of furniture applications.

With its origins rooted in ancient traditions of craftsmanship, rattan has transcended geographical boundaries to become a cherished staple in homes, resorts, and commercial spaces worldwide. From classic wicker chairs to contemporary rattan lounge sets, this resilient material continues to captivate with its rustic allure and eco-friendly credentials, offering both aesthetic appeal and functional longevity in equal measure.

As we delve deeper into the world of rattan, we uncover not just a material, but a rich tapestry of culture, craftsmanship, and sustainable design.

Illustration 13 (top) : Rattan vines in tropical rainforest
Source: therattancompany.co.uk

Illustration 14 (Bottom Left) : Raw harvested rattan
Source: tctile.net

Illustration 15 (Bottom Right) : Harvested and dried rattan
Source: superostmk.live

1.3.1 PROPERTIES OF RATTAN

1. STRENGTH AND DURABILITY

Rattan possesses remarkable tensile strength, allowing it to withstand considerable weight and pressure without breaking or deforming. This inherent durability ensures that rattan furniture maintains its structural integrity over time, even with regular use. Its resilience to wear and tear makes it particularly well-suited for furniture pieces that experience frequent usage, such as chairs and tables.

2. FLEXIBILITY

Rattan's flexibility is one of its most distinctive properties, enabling artisans to manipulate it into intricate patterns and shapes. This flexibility facilitates the weaving and bending of rattan strands, allowing for the creation of complex designs and ergonomic shapes in furniture construction. As a result, rattan furniture can feature graceful curves and contours that enhance both its aesthetic appeal and comfort.

3. LIGHTWEIGHT

Despite its strength, rattan is exceptionally lightweight compared to many other materials commonly used in furniture construction, such as wood or metal. This lightweight nature makes rattan furniture easy to move and transport, allowing for effortless rearrangement of indoor and outdoor spaces. It also contributes to the versatility of rattan furniture, making it suitable for use in various settings and environments.

4. ECO FRIENDLY

Rattan are renewable and grow abundantly in tropical regions. Unlike traditional wood harvesting, rattan cultivation typically has a lower environmental impact, as it does not require clear-cutting of forests or extensive land use. Additionally, rattan cultivation can contribute to local economies in regions where it is grown, providing sustainable livelihoods for communities while promoting biodiversity and conservation efforts.

5. VERSATILITY

Rattan's versatility as a material allows it to be used in a wide range of furniture styles and designs, from classic to contemporary. Its flexibility enables intricate weaving techniques and creative forms, making it suitable for various furniture pieces, including chairs, tables, sofas, beds, and accessories. Rattan can also be combined with other materials such as wood, metal, or upholstery to create hybrid designs that blend traditional craftsmanship with modern aesthetics.

6. LOW MAINTENANCE

Rattan furniture requires minimal care to preserve its beauty and longevity. Regular dusting with a soft cloth or vacuuming with a brush attachment helps remove surface debris and prevent build-up of dirt and dust. Occasional cleaning with a mild soap solution and gentle scrubbing can remove stains and maintain the rattan's natural luster. Additionally, applying a protective finish or wax can help enhance the durability and moisture resistance of rattan furniture, prolonging its lifespan and ensuring years of enjoyment.

TYPES OF RATTAN FOUND IN INDIA

1. CALAMUS TENUIS (THORNY RATTAN OR JAMBU)

Also known as “Thorny Rattan” or “Jambu,” this species is native to the northeastern states of India, particularly **Assam** and **Meghalaya**. It is characterized by its slender, thorny stems and is often used in traditional crafts and furniture making.

Characteristics: This rattan species is known for its slender stems and thorny appearance, with sharp spikes protruding from the surface.

Distribution: Calamus tenuis is primarily found in the northeastern states of India, particularly Assam and Meghalaya, where it thrives in the region’s tropical forests.

Uses: Despite its thorny nature, Calamus tenuis is valued for its flexibility and strength, making it suitable for weaving into baskets, mats, and traditional furniture pieces in local crafts.

Illustration 16 (top) : Raw Calamus Tenuis in the rainforest
Source: Vistacreate

Illustration 17 (Bottom Left) : Calamus-tenuis
Source: www.flickr.com

Illustration 18 (Bottom Right) : Calamus tenuis
Source: Wikipedia

2. CALAMUS MANAN (MANAU RATTAN)

Commonly referred to as "Manau Rattan," this species is found in the forests of **Northeastern India,** as well as in other parts of Southeast Asia. It is prized for its strong and flexible stems, making it suitable for weaving into various handicrafts and furniture items.

Characteristics: Calamus manan features strong and flexible stems, with a smooth surface and relatively few thorns.

Distribution: This rattan species is found in the forests of northeastern India, as well as in other parts of Southeast Asia.

Uses: Calamus manan is prized for its versatility and durability, making it ideal for weaving into intricate patterns in handicrafts, furniture making, and construction projects.

Illustration 19 (top) : Raw Calamus manan (Manau Rattan)
Source: plantamor.com

Illustration 20 (Bottom Left) : Calamus manan (Manau Rattan)
Source: plantamor.com

Illustration 21 (Bottom Right) : Calamus manan Miq., Rattan
Source: identify.plantnet.org

3. CALAMUS PSEUDOTENUIS (KAJIA)

Also known as “Kajia,” this rattan species is found in the north-eastern states of India, including **Assam**, **Arunachal Pradesh**, and **Nagaland**. It is used for making traditional handicrafts, baskets, and furniture.

Characteristics: Calamus pseudotenuis, also known as Kajia, exhibits slender stems with a smooth surface and minimal thorns.

Distribution: Found in the northeastern states of India, including Assam, Arunachal Pradesh, and Nagaland, Kajia rattan thrives in the region’s humid and tropical climate.

Uses: Kajia rattan is commonly used in traditional crafts and furniture making, where its pliable stems are woven into baskets, mats, and other household items.

Illustration 22 (top) : Raw Calamus pseudotenuis
Source: powo.science.kew.org

Illustration 23 (Bottom Left) : Calamus pseudotenuis
Source: powo.science.kew.org

Illustration 24 (Bottom Right) : Calamus pseudotenuis
Source: slbutterflies.lk

4. CALAMUS AUSTRALIS (INDIAN CANE)

This rattan species, known as “Indian Cane,” is found in the forests of southern India, particularly in the Western Ghats region. It is valued for its strong and durable stems, which are used in handicrafts, furniture making, and construction.

Characteristics: Indian Cane is characterized by its strong and durable stems, which are relatively smooth and free of thorns.

Distribution: This rattan species is found in the forests of southern India, particularly in the Western Ghats region, where it grows amidst dense vegetation.

Uses: Indian Cane is valued for its strength and flexibility, making it suitable for a wide range of applications, including handicrafts, furniture making, and construction materials.

Illustration 25 (top) : Raw Calamus Australis
Source: www.flickr.com

Illustration 26 (Bottom Left) : Calamus australis
Source: Wikipedia

Illustration 27 (Bottom Right) : Calamus australis
Source: palmpedia.net

5. CALAMUS FLAGELLUM

Commonly known as "**Fishtail Rattan**," this species is found in the forests of northeastern India, as well as in other parts of Southeast Asia. It is characterized by its distinctive fish-tail-shaped leaflets and is used in traditional crafts and furniture making.

Characteristics: Fishtail Rattan is named for its distinctive fishtail-shaped leaflets, which adorn its long, slender stems.

Distribution: Found in the forests of northeastern India and other parts of Southeast Asia, Calamus flagellum thrives in humid and tropical climates.

Uses: Despite its unique appearance, Fishtail Rattan is utilized in traditional crafts and furniture making, where its flexible stems are woven into intricate patterns to create decorative and functional pieces.

Illustration 28 (top) : Raw Calamus flagellum
Source: efloraofindia.com

Illustration 29 (Bottom Left) : Calamus flagellum
Source: stories.rbge.org.uk

Illustration 30 (Bottom Right) : Calamus flagellum
Source: efloraofindia.com

1.3.2 HISTORY AND CULTURAL SIGNIFICANCE OF RATTAN IN THE NORTH-EAST INDIA

The history and cultural significance of rattan in the northeastern part of India are deeply rooted in the region's rich biodiversity and indigenous traditions. Rattan has been a vital resource for local communities for centuries, playing a central role in their cultural practices and economic livelihoods.

Historically, rattan has been harvested from the lush forests of the northeastern states, including Assam, Meghalaya, Arunachal Pradesh, Nagaland, and Manipur. Indigenous tribes such as the Bodos, Khasis, Garos, and Naga people have long relied on rattan for crafting a variety of utilitarian items, including baskets, mats, furniture, and household utensils. The knowledge of rattan weaving and craftsmanship has been passed down through generations, with each community developing its unique techniques and styles.

Culturally, rattan holds significant symbolism in the northeastern states, representing resilience, sustainability, and community ties. It is often used in traditional ceremonies, festivals, and rituals, where intricately woven rattan artifacts play a symbolic role in spiritual practices and social gatherings. Rattan craftsmanship is also integral to the cultural identity of many indigenous tribes, with certain weaving patterns and motifs carrying deep cultural meanings and stories.

In addition to its cultural significance, rattan plays a crucial role in the local economy of the northeastern states. Rattan harvesting and weaving provide employment opportunities for many rural communities, particularly women and artisans from marginalized backgrounds. The sustainable harvesting of rattan promotes environmental conservation and biodiversity conservation in the region, contributing to the preservation of the unique ecosystems of the northeastern forests.

Illustration 31 (top) : Cane products display in Imphal, Manipur
Source: kanglaonline.in

Illustration 32 (Bottom Left) :Cane Bamboo Basket
Source: ignca.gov.in

Illustration 33 (Bottom Right) : Cane handicraft store in Imphal, Manipur.
Source: www.camelcraft.com

1.3.3 SUSTAINABILITY

1. RENEWABLE RESOURCE

Natural Growth: Cane, derived from the rattan palm family, grows abundantly in tropical forests and is considered a renewable resource.

Fast Growth Rate: Rattan plants have a rapid growth rate, with some species capable of reaching maturity within a few years, making them readily available for harvesting.

2. LOW ENVIRONMENTAL IMPACT

Minimal Habitat Disruption: Harvesting rattan typically involves selective cutting rather than clear-cutting, minimizing habitat disruption and preserving biodiversity in forest ecosystems.

Reduced Carbon Footprint: Compared to the extraction of non-renewable materials like metals or plastics, rattan harvesting and processing have a lower carbon footprint, contributing to lower greenhouse gas emissions.

3. SUSTAINABLE HARVESTING PRACTICES

Selective Harvesting: Sustainable rattan harvesting practices focus on selectively harvesting mature stems while allowing younger plants to continue growing, ensuring the long-term viability of rattan populations.

Regulations and Certification: Some regions have implemented regulations and certification systems to promote sustainable rattan harvesting practices, such as limiting harvesting quotas and promoting responsible land management.

4. NATURAL MATERIAL PROPERTIES

Biodegradability: Cane, being a natural material, is biodegradable, meaning it can decompose naturally over time without causing long-term environmental pollution.

Non-toxic: Rattan is non-toxic and does not release harmful chemicals or pollutants into the environment, further enhancing its eco-friendly credentials.

5. SUPPORT FOR LOCAL COMMUNITIES

Livelihoods: Rattan harvesting and processing provide employment opportunities for many rural communities, particularly in developing countries where rattan is cultivated.

Income Diversification: For indigenous communities and small-scale farmers, rattan cultivation and weaving offer an additional source of income, reducing reliance on monoculture farming or extractive industries.

6. PROMOTION OF SUSTAINABLE PRACTICES

Education and Awareness: Promoting awareness about the sustainable properties of cane and the importance of responsible rattan harvesting practices can encourage consumers to make environmentally conscious choices.

Investment in Research: Continued investment in research and development of sustainable rattan cultivation techniques and processing methods can further improve the environmental sustainability of cane-based products.

1.3.4 VERSATILITY

The versatility of rattan stems from its unique combination of properties, making it suitable for a wide range of applications.

1. ADAPTABILITY IN DESIGN

Rattan's flexibility allows it to be woven, bent, and shaped into various forms, making it adaptable to different design styles and aesthetics. Whether traditional or contemporary, rattan can be crafted into intricate patterns or sleek modern designs to suit diverse tastes.

- Rattan's pliability allows artisans to weave, bend, and mold it into various shapes and forms, ranging from intricate patterns to sleek modern designs.
- Traditional weaving techniques can be employed to create classic rattan furniture with ornate details, while contemporary designs may feature minimalist lines and geometric shapes.

2. INDOOR AND OUTDOOR USE

Rattan furniture is versatile enough to be used both indoors and outdoors. While it adds a touch of warmth and texture to interior spaces like living rooms and bedrooms, rattan is also durable enough to withstand outdoor conditions, making it ideal for patio furniture and garden sets.

- Rattan furniture is suitable for both indoor and outdoor environments due to its natural resilience and durability.
- Indoors, rattan adds warmth and texture to living spaces, while outdoor rattan furniture withstands exposure to sunlight, rain, and humidity without deteriorating

3. RANGE OF FURNITURE PIECES

Rattan can be used to create a wide variety of furniture pieces, including chairs, tables, sofas, beds, shelving units, and even lighting fixtures. Its versatility allows for the creation of entire furniture collections or individual statement pieces.

- Rattan can be crafted into a diverse array of furniture pieces to fulfill various functional needs and aesthetic preferences.
- Common rattan furniture includes chairs, tables, sofas, beds, ottomans, and storage units, catering to different areas of the home or outdoor spaces.

4. BLEND WITH OTHER MATERIALS

Rattan blends seamlessly with other materials such as wood, metal, glass, and upholstery fabrics. This versatility enables designers to create hybrid furniture pieces that combine the unique characteristics of rattan with the strength and durability of other materials.

- Rattan complements a wide range of materials, allowing for creative combinations that enhance both aesthetics and functionality.
- It can be paired with wood for structural support, metal for added strength, glass for tabletops, or upholstery fabrics for cushioning and comfort.

5. CUSTOMIZATION OPTIONS

Rattan furniture offers customization options in terms of finishes, colors, and weaving patterns. Whether stained to enhance its natural beauty or painted to add a pop of color, rattan can be customized to complement any interior decor scheme.

- Rattan furniture offers customization possibilities to meet individual preferences and interior design schemes.
- Finish options include staining to enhance the natural beauty of rattan, painting for a splash of color, or clear coating for added protection and shine.

6. PORTABILITY AND LIGHTWEIGHT

Rattan's lightweight nature makes it easy to move and rearrange furniture pieces as needed. This portability adds to its versatility, allowing for quick and effortless transformations of living spaces.

- Rattan's lightweight nature makes it easy to move and rearrange furniture pieces, facilitating quick transformations of living spaces.
- This portability is especially advantageous for outdoor furniture, allowing users to relocate pieces according to changing weather conditions or social gatherings.

1.3.5 DURABILITY AND LONGEVITY

1. NATURAL STRENGTH

Rattan is inherently strong and resilient, thanks to its fibrous composition and natural growth characteristics. Its sturdy stems can withstand considerable weight and pressure without easily breaking or deforming.

2. FLEXIBLE YET ROBUST

Despite its flexibility, rattan is surprisingly robust. Its pliable nature allows it to bend and flex without snapping, making it durable against repeated use and movement.

3. RESISTANCE TO WEAR AND TEAR

Rattan furniture is resistant to wear and tear, maintaining its structural integrity even with regular use over time. Its durable construction ensures that rattan pieces can withstand everyday activities without significant signs of wear.

4. RESILIENCE TO PESTS AND PROLONGED USE

Rattan is naturally resistant to pests such as termites and insects, reducing the risk of damage from infestations. Additionally, its durable construction ensures that rattan furniture maintains its strength and stability even with prolonged use.

5. LOW MAINTENANCE REQUIREMENTS

Rattan furniture is relatively low maintenance, requiring minimal care to preserve its durability and appearance. Routine cleaning with a damp cloth or gentle vacuuming helps remove dust and debris, while occasional polishing or conditioning can enhance its natural luster and longevity.

6. ADAPTABILITY TO ENVIRONMENTAL CONDITIONS

Rattan exhibits excellent adaptability to various environmental conditions. It is resistant to moisture, mildew, and rot, making it suitable for both indoor and outdoor use.

Additionally, rattan's natural resistance to UV radiation helps prevent fading and deterioration when exposed to sunlight, ensuring long-lasting durability in outdoor settings.

7. LONGEVITY

When properly cared for, rattan furniture can last for many years, often outlasting other materials used in furniture construction. Its durability ensures that rattan pieces retain their functionality and aesthetic appeal for generations, making them a worthwhile investment.

1.3.6 INTEGRATION WITH OTHER MATERIALS

The integration of materials with rattan allows for the creation of furniture pieces that combine the unique characteristics of each material, resulting in innovative designs that blend functionality, aesthetics, and durability.

1. WOOD

- Wood is often integrated with rattan to provide structural support and reinforcement. Wooden frames or legs can be combined with rattan weaving to create sturdy and stable furniture pieces.
- The combination of wood and rattan adds warmth and texture to furniture designs, creating a harmonious balance between natural materials.

Illustration 34 : Seabrook Rattan Couch
Source: www.trendcollections.com.au

2. METAL

- Metal elements, such as steel or aluminum, are frequently used in conjunction with rattan to enhance strength and durability, especially in outdoor furniture.
- Metal frames or accents can be integrated into rattan furniture to provide additional stability and resistance to environmental factors such as moisture and rust.

Illustration 35 : Rattan Armchair Sand Beige Wicker Black Metal Legs
Source: homedone.co.uk

3. GLASS

- Glass tabletops are commonly paired with rattan bases to create elegant and contemporary dining or coffee tables.
- The combination of glass and rattan adds a touch of sophistication to furniture designs, while allowing the natural beauty of rattan to shine through.

Illustration 36 (Left) : Mid Century Rattan Glass Top Dining Table
Source: iqlovevs.live

Illustration 37 (Right) : Rattan glass dining table
Source: 1stdibs.com

4. UPHOLSTERY FABRICS

- Upholstery fabrics, such as cushions or seat pads, are often used to enhance the comfort and aesthetics of rattan furniture.
- Fabric cushions can be added to rattan seating to provide softness and support, while also allowing for customization in terms of color, pattern, and texture.

Illustration 38 (Left) : RATTAN VENUS CHAIR SOANE BRITAIN
Source: freeobjvs.life

Illustration 39 (Right) : Rattan Upholstered Venus Chair
Source: www.soane.co.uk

5. LEATHER OR WOVEN MATERIALS

- Leather or woven materials can be combined with rattan to create intricate patterns or decorative accents on furniture pieces.
- The integration of leather or woven materials adds visual interest and texture to rattan furniture, enhancing its overall design aesthetic.

Illustration 40 (Left) : Balfour Woven Rattan Host Chair
Source: jacksonvillefurnituremart.com

Illustration 41 (Right) : Pin on Decor
Source: saleunitvs.live

6. SYNTHETIC MATERIALS

- Synthetic materials, such as resin wicker or polyethylene rattan, are sometimes integrated with natural rattan to improve durability and weather resistance, especially in outdoor furniture.
- Synthetic rattan materials mimic the appearance of natural rattan while offering enhanced durability and ease of maintenance.

Illustration 42 (Left) : serenaandlily.com
Source: freeobjvs.life

Illustration 43 (Right) : Sofie Dining Chair
Source: sika-design.com

1.4 TOOLS AND CRAFTING METHODS

Crafting rattan furniture involves a combination of traditional hand tools and specialized techniques honed over generations. Here's an overview of the tools and crafting methods commonly used in rattan furniture production.

1. CUTTING TOOLS

- **Machete or Dao or Thang**: Local artisans use these large knives to harvest rattan stems from forests in regions like Assam, Meghalaya, and Manipur, where rattan is abundant.
- **Pruning Shears**: After harvesting, rattan stems are trimmed and pruned using hand-operated pruning shears to remove excess foliage and ensure uniformity.

Illustration 44 : Naga Dao
Source: Wikipedia

Illustration 45 : Manipuri thang
Source: Leishang tools

2. SPLITTING AND STRIPPING TOOLS

- **Rattan Splitter**: Skilled craftsmen manually split rattan stems into thin strips using rattan splitters, preserving the integrity of the material.
- **Hand Stripping**: In smaller workshops, rattan is stripped by hand, with artisans carefully peeling away the outer layers to reveal the inner fibers.

Illustration 46 (Left) : Cane Splitting machine
Source: Yellow pages PH

Illustration 47 (Right) : Traditional hand cane splitting
Source: Author

3. SHAPING AND BENDING TOOLS

- **Forms and Molds**: Artisans shape and bend rattan strips around wooden forms or molds crafted from locally sourced hardwood, often recycled from old furniture or structures.
- **Steam Boxes / Heat bending**: Some craftsmen use traditional steam boxes fueled by wood fires to soften rattan strips before bending, a technique passed down through generations.

Illustration 48 (Left) : Plywood and Nail Mould
Source: Author

Illustration 49 (Right) : Heat bending method
Source: Author

4. JOINERY TOOLS

- **Adhesives**: Natural adhesives like rice paste, sap from local trees or artificial glue may be used sparingly to reinforce joints in rattan furniture.
- **Handheld Tools**: Artisans rely on hand-operated clamps, Nails and vices to hold rattan pieces together during assembly, ensuring precise and secure connections.

Illustration 50 (from left 1) : hand Sanding before the joinery
Source: Author

Illustration 51 (from left 2) : Traditional nail and split cane joinery
Source: Author

Illustration 52 (from left 3&4) : Joinery with nail, wood pulp & flex glue
Source: Author

5. FINISHING TOOLS

- **Hand Sanding**: Rattan furniture pieces are meticulously hand-sanded using small knife, coarse and fine sandpaper to achieve a smooth finish.
- **Natural Finishes**: In rural workshops, craftsmen may apply natural finishes like linseed oil or beeswax to protect and enhance the appearance of rattan furniture.

Illustration 53 (Left) : Rattan cleaning with knife
Source: Author

Illustration 54 (Right) : Linseed oil
Source: Ubuy India

4. JOINERY TOOLS

- **Traditional Weaving Tools**: Skilled weavers use traditional tools such as weaving needles, awls, and weaving frames to create intricate patterns and designs in rattan furniture.
- **Artisan Techniques**: Each region in India has its own weaving techniques and patterns, reflecting the cultural diversity and craftsmanship of the local artisans.
- **Machine Weaving**: In larger-scale production settings, machine weaving may be employed to increase efficiency and consistency in rattan furniture production. Automated weaving machines replicate traditional weaving patterns while enhancing productivity, although handweaving remains valued for its artisanal quality and authenticity.

Illustration 55 : Traditional hand weaving
Source: www.dsource.in

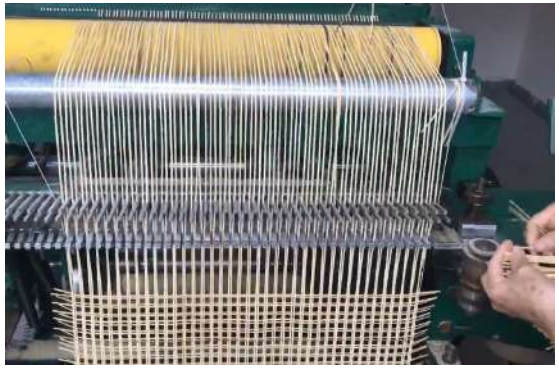


Illustration 56 : Machine weaving
Source: JY Rattan (YT)

1.5 MARKET SCENARIOS, TREND AND IMPACTS

1. MARKET GROWTH AND DEMAND

- **Rising Preference for Sustainable and Eco-Friendly Products**: With growing awareness of environmental issues and sustainability concerns, consumers are increasingly seeking eco-friendly alternatives in their purchasing decisions. Rattan, being a natural and renewable resource, aligns well with these preferences, leading to heightened demand for rattan furniture and products.

- **Shift in Interior Design Trends**: Rattan furniture has witnessed a resurgence in popularity as a result of evolving interior design trends. Designers and homeowners alike are drawn to rattan's natural aesthetic, versatility, and ability to add warmth and texture to living spaces. The rise of bohemian, coastal, and tropical design themes has further propelled the demand for rattan furniture, driving market growth.

- **Expanding Market Reach:** The rattan market is not only growing in traditional markets but also expanding into new regions and demographics. As global connectivity increases and consumer preferences become more homogenized, rattan furniture is gaining popularity in diverse markets worldwide. ularly lucrative markets for rattan products.

- **Innovations in Design and Manufacturing**: Manufacturers are continuously innovating to meet changing consumer preferences and market demands. Modern interpretations of rattan furniture feature innovative designs, materials, and finishes that cater to contemporary tastes.

2. DESIGN TRENDS AND INNOVATIONS

- **Contemporary Interpretations**: Rattan furniture is undergoing a renaissance in contemporary design, with designers incorporating sleek lines, geometric shapes, and minimalist forms to create modern interpretations of classic rattan pieces. Clean, uncluttered designs with streamlined silhouettes are favoreds, offering a fresh and sophisticated look that complements a variety of interior styles

- **Mixed Materials and Textures**: Designers are experimenting with the integration of rattan with other materials such as metal, wood, glass, and upholstery fabrics to add visual interest and depth to furniture pieces. Contrasting textures, such as pairing rattan with smooth marble or rugged reclaimed wood, create dynamic visual compositions that elevate the overall design aesthetic.

- **Sustainable Design Practices:** Sustainability is a driving force behind design innovations in the rattan industry. Designers and manufacturers are prioritizing eco-friendly materials, responsible sourcing practices, and energy-efficient production methods to minimize environmental impact. Up-cycling and re purposing of rattan materials are becoming prevalent.

- **Innovative Weaving Techniques**: Traditional weaving techniques are being reimagined and reinvented to push the boundaries of rattan furniture design. Artisans are exploring intricate weaving patterns, asymmetrical designs, and three-dimensional textures to add depth and dimension to rattan furniture.

3. SUPPLY CHAIN DYNAMICS

- **Raw Material Sourcing:** Rattan stems are harvested from forests in tropical regions, primarily in Southeast Asia, Africa, and parts of South America. Local communities or rattan cooperatives typically engage in the harvesting process, using traditional tools and techniques to extract rattan stems sustainably. The availability and quality of rattan raw materials depend on factors such as forest management practices, climate conditions, and government regulations governing rattan harvesting and trade.

- **Processing and Manufacturing:** After harvesting, rattan stems undergo processing to remove thorns, outer layers, and excess foliage. The processed rattan is then sorted, graded, and prepared for manufacturing. Rattan processing facilities, often located near major rattan-producing regions, employ skilled craftsmen and specialized machinery to transform raw rattan into usable materials, including split strands, poles, and cores,

- **Production and Assembly**: Rattan furniture production may take place in dedicated workshops, factories, or cottage industries, depending on the scale and specialization of manufacturers. Skilled artisans and craftsmen handcraft rattan furniture using traditional techniques or modern machinery, depending on the production requirements and quality standards. Assembly processes involve weaving, bending, and joining rattan components to create finished furniture pieces, which may include chairs, tables, sofas, and decorative items.

4. CONSUMER PREFERENCES AND

- **Sustainability and Eco-Friendliness**: Increasing environmental awareness and concerns about sustainability have led consumers to prioritize eco-friendly materials and products. Rattan, being a natural and renewable resource, aligns well with these values, appealing to environmentally conscious consumers seeking sustainable alternatives to synthetic materials.

- **Natural Aesthetic and Organic Appeal**: Rattan's natural aesthetic and organic appeal resonate with consumers seeking to create harmonious and inviting living spaces inspired by nature. The warmth, texture, and earthy tones of rattan furniture and decor evoke a sense of comfort, relaxation, and connection to the natural world. Consumers appreciate the timeless and versatile nature of rattan products, which can complement a wide range of interior design styles, from coastal and bohemian to Scandinavian and tropical themes.

- **Quality, Durability, and Craftsmanship:** Quality and durability are paramount considerations for consumers when choosing rattan products. Craftsmanship, attention to detail, and the use of high-quality materials contribute to the perceived value and longevity of rattan furniture and decor. Consumers are willing to invest in well-crafted rattan products that offer superior durability, comfort, and aesthetic appeal, viewing them as long-term investments that enhance the quality of their living spaces.

1.6 SITE VISIT

1.6.1 EXPLORING THE RATTAN INDUSTRY: INSIGHTS FROM A TWO-WEEK SITE VISIT IN GUWAHATI,

During the two-week site visit in Guwahati, Assam, a comprehensive exploration was undertaken to gain insights into various aspects of the rattan industry. The following topics were covered to deepen understanding and gather valuable information :

1. Background Information

- Investigation into the historical context and cultural significance of rattan craftsmanship in Assam.
- Examination of the traditional techniques and practices passed down through generations within the rattan artisan community.

Illustration 57 : Mr. Biplaba Nanda's Cane and Bamboo workshop, Rampur, Assam.
Source: Author

Illustration 58 : Author with tow local artisan, Mr. Biplaba Nanda (middle), Mr. Pradip Das (right).
Source: Author

2. Artisan Community

- Engagement with local rattan workers and artisans to understand their backgrounds, skills, and contributions to the industry.
- Exploration of the socio-economic factors impacting the livelihoods and well-being of the artisan community.

3. Market Analysis

- Analysis of the local rattan market dynamics, including demand trends, competitive landscape, and consumer preferences.
- Assessment of market opportunities and challenges for rattan entrepreneurs and businesses operating in Guwahati and surrounding areas.

4. Entrepreneurship and Innovation

- Identification of entrepreneurial initiatives and innovative practices within the rattan industry, such as product diversification, design innovation, and value-added services.
- Exploration of opportunities for fostering entrepreneurship and promoting innovation among rattan artisans and small-scale businesses.

5. Material

- Examination of rattan as a primary material, including its properties, sustainability, and sourcing practices.
- Assessment of the environmental and social implications of rattan harvesting and processing in the region.

6. Tools & Methods

- Study of the tools, equipment, and techniques used in rattan crafting, including traditional hand tools and modern machinery.
- Hands-on experience with rattan weaving, bending, and finishing processes to understand the craftsmanship involved in rattan furniture production.

7. Consumer Behavior

- Investigation into consumer preferences and behavior related to rattan products, including factors influencing purchasing decisions, design trends, and sustainability considerations.
- Analysis of consumer attitudes towards locally made rattan products compared to imported alternatives.

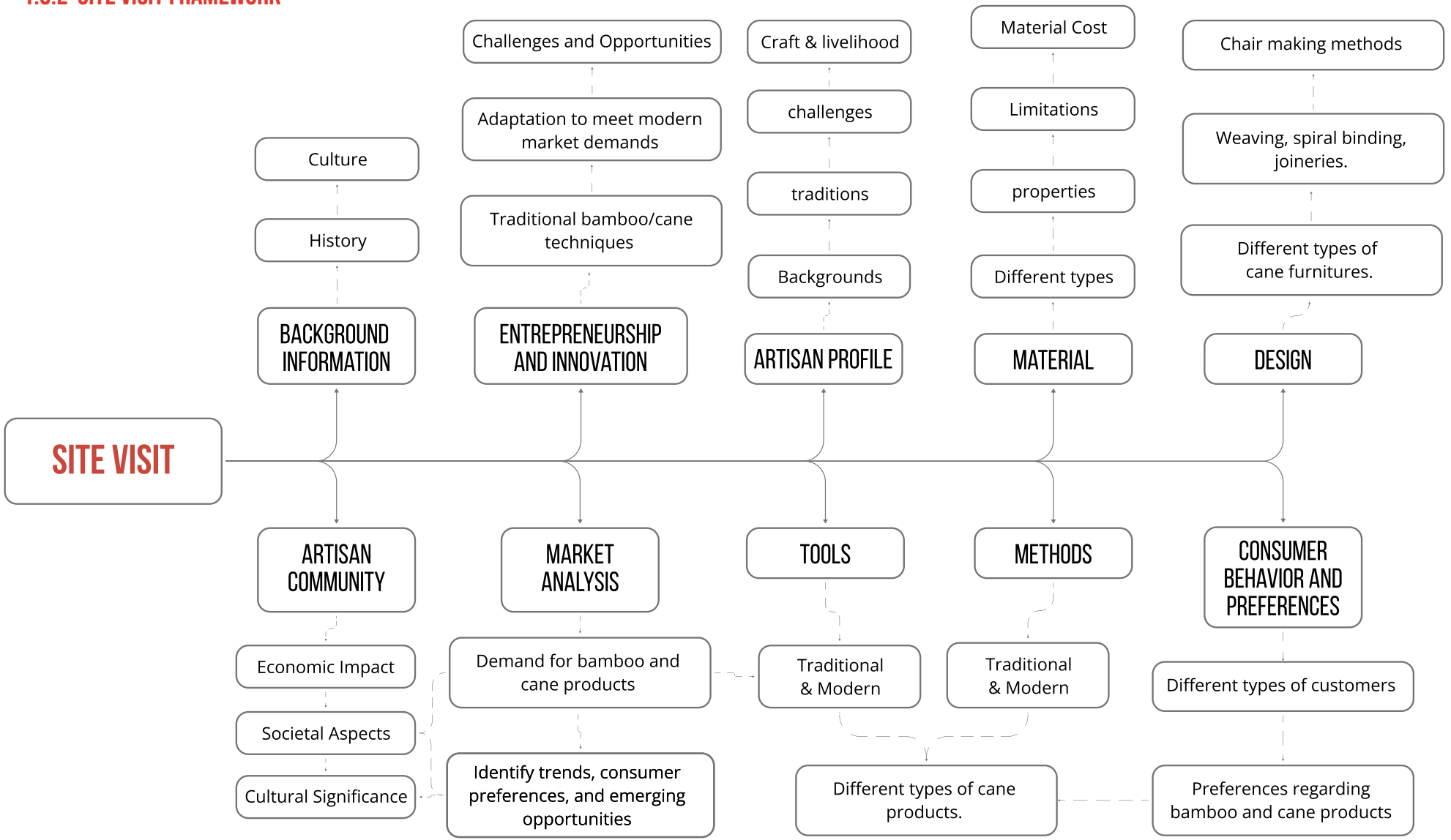
8. Social and Cultural Aspects

- Exploration of the cultural heritage and traditional knowledge embodied in rattan craftsmanship, reflecting the region's diverse cultural tapestry.
- Documentation of the social cohesion and community bonding fostered by the rattan artisan community, transcending linguistic, ethnic, and religious boundaries.

9. Challenges and Opportunities

- Identification of key challenges confronting the rattan industry, Analysis of market dynamics, including competition from alternative materials, changing consumer preferences, and globalization pressures.

1.6.2 SITE VISIT FRAMEWORK



1.6.3 KEY INSIGHTS & LEARNINGS

As awareness of cane products increases, so does market competition. Cane artisans face two primary competitors: fellow artisans and mass-produced furniture manufactured by machines. To sustain their businesses, artisans must continuously innovate, offering new designs and aesthetics to attract customers. In a saturated market where every artisan is vying for attention, unique design elements are crucial for success. This emphasis on design is driven by evolving consumer preferences, particularly among home decor enthusiasts and different range of clients who seek novelty and exclusivity in their purchases. Ultimately, meeting the demands of the modern market and ensuring customer satisfaction necessitates a deep understanding of the importance of new design ideas and innovations among cane artisans.

Types of different cane in the market

Rattan cane, a versatile material used in furniture making, comes in various types, each with its unique characteristics and applications. The three main types commonly found in the market are **Jang** cane, **Raidang** cane, and **Jati** cane.

Illustration 59 : "Jang" cane
Source: Author

Illustration 60 : "Raidang" cane
Source: Orchid edition

Illustration 61 : "jati" cane
Source: Author

Jang Cane

- Economical and Cost Effective: Jang cane is the preferred choice for furniture making due to its affordability and cost-effectiveness, making it a profitable option for artisans.
- Price and Size: Each piece of Jang cane costs approximately 40 rupees and measures 10-12 feet in length with a diameter of 1 inch.
- Dark and Uneven Color: While cost-effective, Jang cane has a darker and uneven color, which may affect the overall aesthetics of the furniture.
- Structural Support: Due to its smaller diameter, additional cane pieces are often required for structural support in furniture like chairs and tables.
- Example: A sofa set made of Jang cane typically costs around 16,000 rupees.

Illustration 62 (Top) : Jang cane Table, stool and chair
Source: Author

Illustration 63 (Middle) : Jang cane chair
Source: Author

Illustration 64 (Bottom) : Support structure of a jang cane chair
Source: Author

Raidang Cane

- Brighter and Even Color: Raidang cane offers a brighter and more even color compared to Jang cane, providing a lighter and cleaner finish to furniture.
- Size and Cost: Each Raidang cane piece measures 12-14 feet in length with a diameter of 1-2 inches, making it larger and costlier than Jang cane. It costs approximately 350 rupees per piece, typically sold in bulk orders of 300-400 pieces.
- No Structural Support Needed: Due to its larger diameter, Raidang cane does not require additional structural support, contributing to its suitability for high-quality furniture.
- Limited Usage: Despite its superior properties, Raidang cane is used selectively due to its higher cost. It is usually reserved for special requests from certain clients.
- Example: A sofa set made of Raidang cane may cost around 35,000 rupees, double the price of a Jang cane sofa set.

Illustration 65 (Top) : Rattan sofa
Source: edition.cnn.com

Illustration 66 (bottom left) : Sunwashed Riviera Counter Stool
Source: serenaandlily.com

Illustration 67 (Bottom right) : Hanging Rattan Chair
Source: serenaandlily.com

Jati Cane

- Smaller Diameter and Flexibility: Jati cane is the smallest in size among the three types, known for its smaller diameter and flexibility.
- Application: Primarily used for making cane strips for weaving and as binders for furniture joineries due to its smaller size and flexibility.
- Price and Size: Each Jati cane piece costs around 15 rupees and measures 10-14 feet in length with a diameter of 0.5 inches.
- Additional Uses: Jati cane is also used to fill smaller sections of cane furniture and for making spiral furniture.
- Example: Commonly used for intricate weaving patterns and as structural support in furniture joints.

Illustration 68 (Left) : Jati cane spiral chair
Source: Author

Illustration 69 (Middle) : Dried Jati cane
Source: Author

Illustration 70 (Right) : Jati cane splits
Source: Author

Bending method AND JOINERY

Crafting rattan furniture involves a simple but essential step: bending the cane. The most common method is heat bending. Artisans use a blow torch to warm the cane in the desired area, making it flexible enough to shape according to the furniture design. To make this process easier, they also use basic wooden tools and moulds. These tools help them bend the cane accurately without compromising the furniture's strength.

The primary method of joinery in rattan furniture making involves hammering nails into place. To conceal the nails and enhance the aesthetics, artisans wrap split cane around the joinery. This covering not only hides the nail heads but also adds to the visual appeal of the furniture. Additionally, adhesive options like super glue or Feviquick HR may also be utilized for joining components together.

Illustration 71 (from Left 1) : Wooden bending tool
Source: Author

Illustration 72 (from left 2) : Heat bending with blow torch
Source: Author

Illustration 73 (from left 3) : heat bending with simple wooden mould
Source: Author

Illustration 74 (from left 4) : Nail and split cane joinery
Source: Author

PART 2

DESIGN PROCESS AND METHODOLOGY

DESIGN BRIEF

TO DESIGN A SMALL LOUNGE CHAIR FOR PEOPLE TO USE IN THEIR VERANDAH, PORCH, BACKYARD AND GARDEN, USING CANE AS THE PRIMARY MATERIAL.

- TO CELEBRATES/TAKE ADVANTAGES OF THE MATERIAL PROPERTY I.E CANE BENDING PROPERTY.
- TO INCORPORATE SPECIALLY DESIGNED JOINERY DETAIL WITHOUT NAIL
- TO EXPLORE THE FUSION OF DIFFERENT MATERIAL WITH CANE.
- HEIGHT ADJUSTMENT FEATURE - HYDRAULIC SUSPENSION
  - I) ZERO GRAVITY LEVEL
  - II) NORMAL REACHING LEVEL

2.2 INDIAN ANTHROPOMETRIC DIMENSIONS

2.2.1 ANTHROPOMETRIC PERCENTILE

Anthropometric percentiles are statistical measures used to assess and categorize human body dimensions based on population data. These percentiles represent the proportion of individuals in a population whose measurements fall below a certain value. Percentiles, such as the 5th, 50th (also known as the median), and 90th percentiles, are used to assess and understand the distribution of body dimensions within a population.

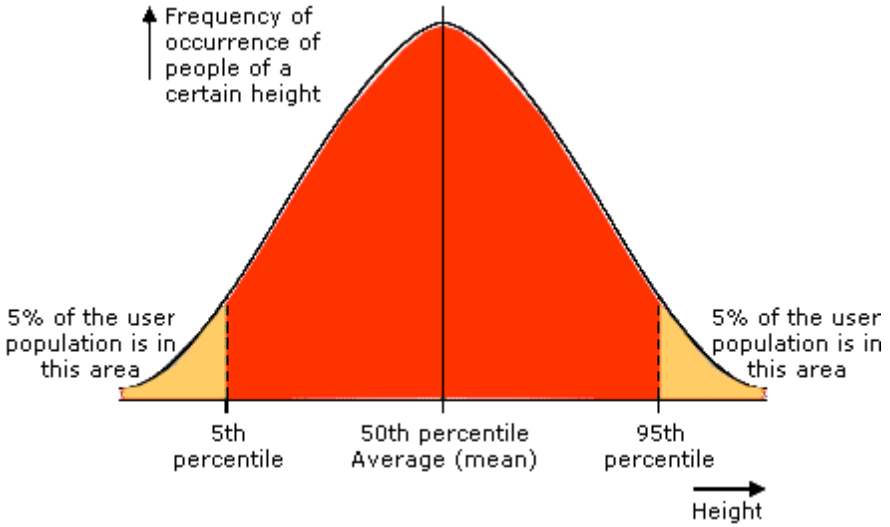


Illustration 75 : Anthro percentile graph 1
Source: ergonomics4schools.com

5TH PERCENTILE

This represents the point below which 5% of the population falls. In anthropometry, the 5th percentile is often used as a reference for the lower end of the distribution. For example, if a child's height is at the 5th percentile, it means that they are taller than 5% of children of the same age and gender and shorter than 95% of them. The 5th percentile is commonly used to identify individuals who may have smaller-than-average body dimensions.

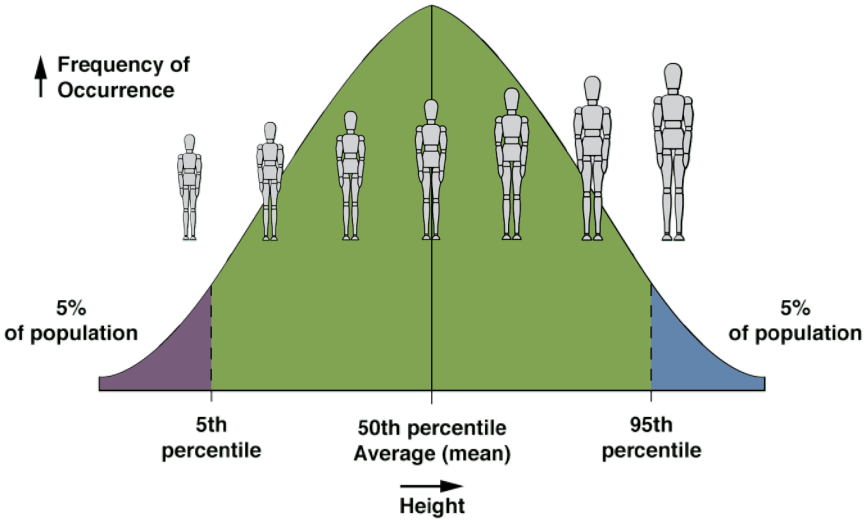


Illustration 76 : Anthro percentile graph 2
Source: bostontec.com

50TH PERCENTILE (MEDIAN)

This represents the point at which 50% of the population falls below and 50% falls above. In other words, it is the midpoint of the distribution. For example, if a child's weight is at the 50th percentile, it means that they weigh more than half of the children of the same age and gender and less than half of them. The 50th percentile is often used as a reference for average body dimensions.

90TH PERCENTILE

This represents the point below which 90% of the population falls. The 90th percentile is often used as a reference for the higher end of the distribution. For example, if a child's head circumference is at the 90th percentile, it means that their head circumference is larger than 90% of children of the same age and gender and smaller than 10% of them. The 90th percentile is commonly used to identify individuals who may have larger-than-average body dimensions.

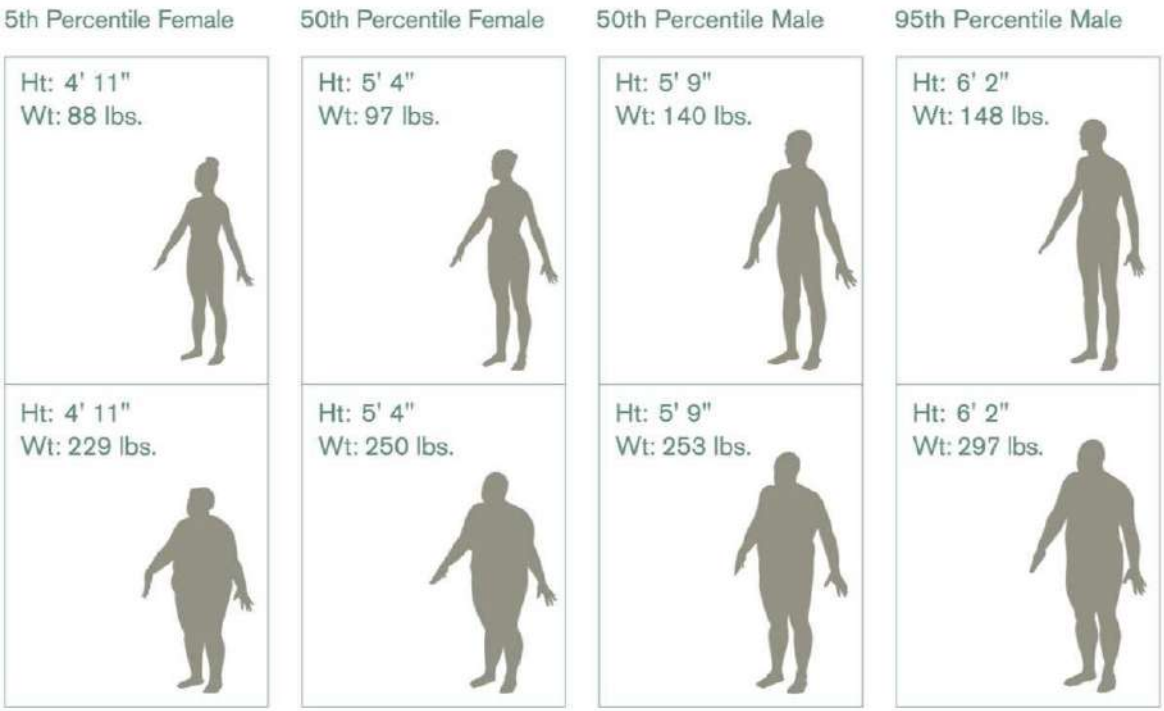
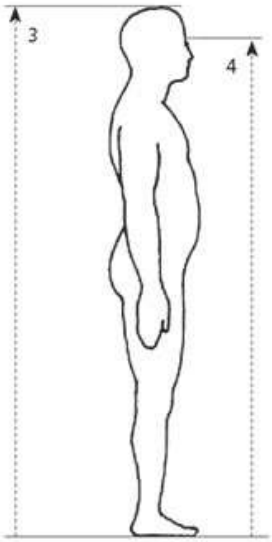
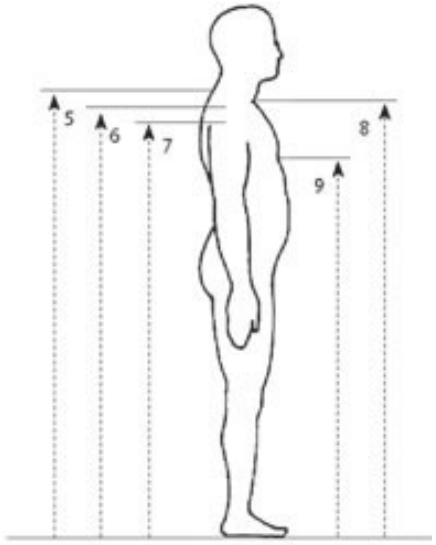


Illustration 77 : Percentile example (context : North American & European)
Source: Hermanmiller.com

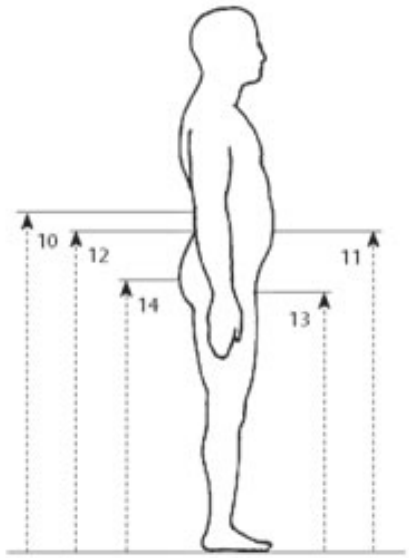
2.2.2 INDIAN ANTHROPOMETRIC DIMENSIONS

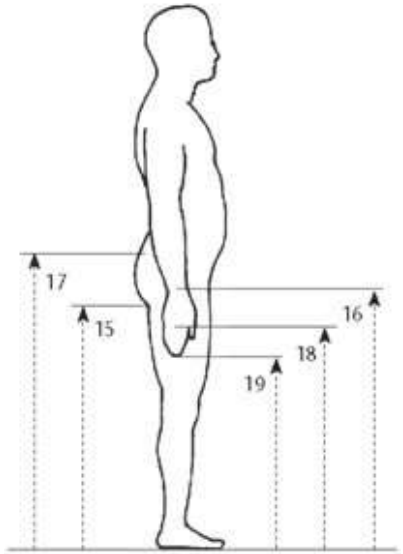
Source reference :- Chakrabarti, D.,1997: Indian Anthropometric Dimensions for Ergonomic design Practice, NID, Ahmedabad, India.



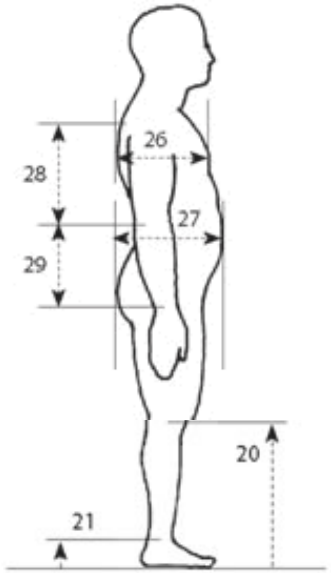


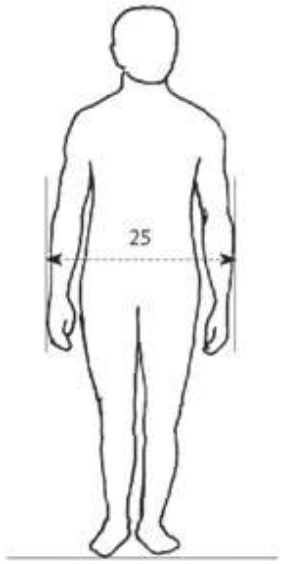
R.No.	Parameters		Min	Percentiles 5th	25th	50th	75th	95th	Max	Mean	±SD	Ratio
1	**Weight, Kg.**	Male	34	42	48	54	62	76	118	57	11	
		Female	30	35	41	48	55	66	88	49.5	9.9	
		Combined	30	40	47	53	60	74	118	55.2	11.3	
2	**Normal standing**	Male	1396	1529	1598	1646	1688	1751	1939	1645	74	0.99
		Female	1276	1406	1457	1504	1548	1615	1681	1506	68	0.99
		Combined	1276	1439	1541	1610	1671	1741	1939	1607	98	0.99
3	**Stature**	Male	1486	1537	1599	1648	1691	1781	1950	1650	70	1
		Female	1288	1429	1478	1517	1567	1632	1711	1523	66	1
		Combined	1288	1465	1555	1619	1673	1771	1950	1614	87	1
4	**Eye**	Male	1293	1419	1485	1529	1571	1645	1821	1530	68	0.93
		Female	1215	1315	1368	1411	1454	1514	1600	1411	62	0.93
		Combined	1215	1355	1445	1507	1557	1633	1821	1502	84	0.93
5	**Cervical**	Male	1186	1300	1363	1409	1450	1511	1705	1408	66	0.86
		Female	1120	1202	1255	1297	1334	1396	1438	1296	58	0.85
		Combined	1120	1247	1327	1387	1437	1503	1705	1384	79	0.86
6	**Mid shoulder**	Male	1168	1271	1338	1381	1420	1485	1635	1381	64	0.84
		Female	1105	1179	1228	1267	1305	1364	1424	1270	57	0.84
		Combined	1105	1216	1294	1357	1408	1471	1635	1352	79	0.84
7	**Acromion**	Male	1011	1235	1305	1351	1390	1459	1598	1349	68	0.82
		Female	1071	1147	1203	1243	1280	1343	1450	1244	62	0.82
		Combined	1011	1184	1270	1327	1379	1448	1598	1325	80	0.82
8	**Supra sternum**	Male	1133	1245	1301	1347	1384	1446	1711	1346	63	0.82
		Female	1128	1163	1206	1243	1281	1339	1380	1244	55	0.82
		Combined	1128	1215	1291	1338	1379	1444	1711	1335	70	0.82
9	**Sub sternum**	Male	974	1088	1141	1180	1219	1282	1701	1183	63	0.72
		Female	964	995	1047	1082	1121	1205	1278	1090	64	0.71
		Combined	964	1070	1133	1175	1216	1279	1701	1176	68	0.72





R.No.	Parameters		Min	Percentiles					Max	Mean	±SD	Ratio
				5th	25th	50th	75th	95th				
10	**Elbow**	Male	791	945	1003	1039	1072	1123	1405	1038	56	0.63
		Female	808	879	923	953	989	1039	1202	956	50	0.63
		Combined	791	908	970	1022	1061	1115	1405	1018	65	0.63
11	**Abdominal extension**	Male	795	925	977	1015	1050	1110	1345	1016	59	0.62
		Female	813	829	857	900	942	1019	1155	908	62	0.59
		Combined	795	881	965	1009	1047	1109	1345	1005	67	0.61
12	**Waist**	Male	819	894	935	970	1005	1053	1170	972	51	0.59
		Female	746	839	893	931	970	1027	1046	931	56	0.61
		Combined	746	875	927	965	1000	1047	1170	963	55	0.6
13	**Crotch**	Male	637	675	731	765	797	849	994	765	52	0.46
		Female	635	669	700	725	757	821	831	733	44	0.48
		Combined	635	675	726	760	795	847	994	762	53	0.47
14	**Buttock extension**	Male	579	767	808	841	869	919	1003	841	49	0.51
		Female	698	726	768	789	826	856	902	794	41	0.52
		Combined	597	746	798	832	862	911	1003	832	51	0.51
15	**Gluteal furrow**	Male	469	682	734	767	793	841	923	765	48	0.46
		Female	623	640	695	727	764	807	833	730	47	0.48
		Combined	469	674	727	760	790	837	923	759	49	0.47
16	**Tip of radius**	Male	616	722	767	793	824	867	950	796	43	0.48
		Female	625	675	712	742	765	815	848	742	40	0.49
		Combined	616	703	753	784	817	862	950	785	48	0.48
17	**Trochanter**	Male	705	774	821	856	887	939	1032	857	50	0.52
		Female	681	736	792	816	853	888	995	819	47	0.53
		Combind	681	768	813	849	881	935	1032	850	51	0.52
18	**Knuckle**	Male	550	639	677	703	735	775	862	707	43	0.43
		Female	601	633	661	687	734	850	867	664	44	0.44
		Combined	550	623	666	696	726	771	867	697	47	0.43
19	**Dactylion**	Male	470	549	584	610	637	682	851	613	45	0.37
		Female	483	519	550	578	599	640	768	578	38	0.38
		Combined	470	534	574	603	631	676	851	605	46	0.37





R.No.	Parameters		Min	Percentiles					Max	Mean	±SD	Ratio
				5th	25th	50th	75th	95th				
20	**Mid–patella**	Male	346	419	445	464	484	517	607	467	32	0.28
		Female	332	368	400	424	450	479	582	427	42	0.28
		Combined	332	410	443	461	482	516	607	464	34	0.28
21	**Lateral malleolus**	Male	42	49	54	57	62	70	80	59	6	0.04
		Female	41	42	50	55	61	65	79	56	7	0.04
		Combined	41	48	54	57	62	70	80	59	7	0.04
22	**Medial malleolus**	Male	54	62	68	73	77	85	96	74	7	0.04
		Female	47	54	64	67	72	84	91	69	8	0.05
		Combined	47	61	67	72	77	85	96	73	7	0.04
23	**Span**	Male	1392	1549	1634	1684	1739	1829	2040	1687	86	1.03
		Female	1395	1431	1485	1549	1599	1679	1750	1549	75	1.02
		Combined	1392	1479	1583	1659	1724	1809	2040	1655	102	1.02
24	**Span akimbo**	Male	700	774	831	859	899	959	1165	866	56	0.53
		Female	650	699	749	789	839	889	1199	796	64	0.52
		Combibed	650	739	809	849	889	949	1199	850	65	0.53
25	**Maximum body breadth (relaxed)**	Male	364	415	459	503	549	619	795	509	68	0.31
		Female	371	391	422	469	519	599	700	477	65	0.31
		Combined	364	405	499	494	539	619	795	502	69	0.31
26	**Chest depth**	Male	173	186	200	214	231	258	394	219	26	0.13
		Female	159	160	190	207	237	293	370	215	43	0.14
		Combined	159	181	198	214	231	265	394	219	29	0.13
27	**Maximum body depth (relaxed)**	Male	195	218	250	291	344	409	635	302	63	0.18
		Female	195	205	245	314	369	439	515	315	76	0.21
		Comined	195	212	249	299	349	419	635	305	66	0.19
28	**Acromion to olecranon tip length**	Male	234	281	299	312	326	356	395	315	22	0.19
		Female	205	263	280	295	316	339	371	299	25	0.2
		Combined	205	272	294	309	324	349	395	311	24	0.19
29	**Olecranon to stylion length**	Male	186	206	228	243	257	289	350	245	25	0.15
		Female	185	192	208	221	241	267	289	226	24	0.15
		Combined	185	200	222	239	255	286	350	241	26	0.15

2.2 ZERO GRAVITY CONCEPT

ZERO GRAVITY CONCEPT IN CHAIR DESIGN

Zero gravity refers to a state or condition where an object experiences no apparent gravitational forces. In the context of chair design, the concept of zero gravity has been applied to create chairs that simulate the posture astronauts assume during spaceflight, where their bodies experience minimal stress due to gravitational forces. These chairs are designed to recline to a position where the body is fully supported, the legs are elevated slightly above the heart, and the spine is in a neutral position.

Uses in Chair Design

Ergonomic Support: Zero gravity chairs are engineered to distribute body weight evenly across the chair, reducing pressure points and promoting optimal spinal alignment. This ergonomic design helps alleviate discomfort and strain, particularly in the back, neck, and shoulders.

Reclining Functionality: Zero gravity chairs typically feature a reclining mechanism that allows users to adjust the chair to their preferred angle. By reclining to a near-horizontal position, users can achieve a sensation of weightlessness and relaxation, similar to the feeling experienced in a zero gravity environment.

Versatility: Zero gravity chairs are versatile pieces of furniture that can be used indoors or outdoors, in various settings such as homes, offices, patios, and spas. They offer users the flexibility to unwind and decompress in a comfortable and supportive position.

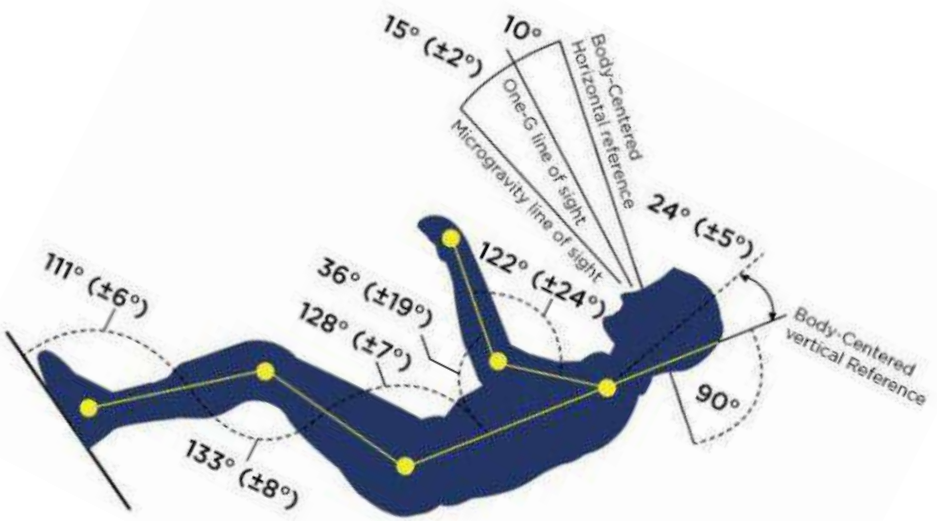


Illustration 78 : Zero gravity position
Source: trustedhealthproducts.com

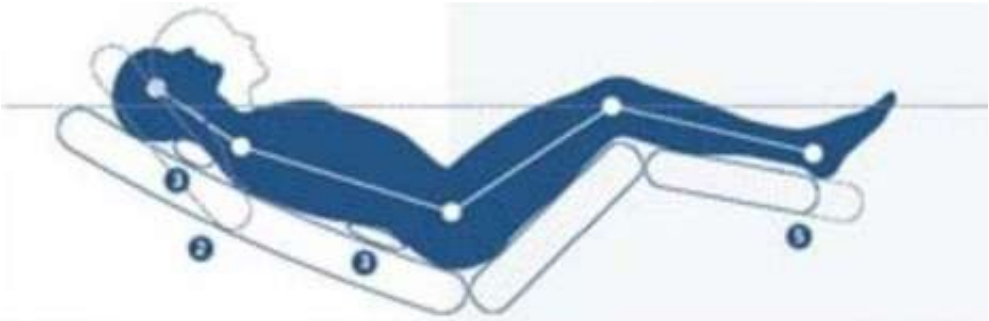


Illustration 79 : Zero gravity position (Chair)
Source: KSR publishers.com

Benefits of Zero Gravity Position

Spinal Decompression: The zero gravity position helps decompress the spine by evenly distributing body weight and reducing pressure on spinal discs. This can alleviate discomfort associated with conditions such as herniated discs, spinal stenosis, and sciatica.

Improved Circulation: Elevating the legs slightly above the heart level promotes blood circulation, reducing strain on the cardiovascular system and helping prevent swelling in the lower extremities. Enhanced circulation can also aid in the recovery from injuries and reduce the risk of blood clots.

Muscle Relaxation: Reclining in a zero gravity chair promotes muscle relaxation and tension relief throughout the body. By eliminating the pull of gravity, muscles can relax more fully, leading to reduced muscle stiffness and improved flexibility.

Stress Reduction: The weightless sensation experienced in a zero gravity chair can induce a state of relaxation and calmness, reducing stress and anxiety levels. This can have positive effects on mental well-being and contribute to overall relaxation and rejuvenation.

2.3 DIMENSIONS, MEASUREMENTS AND SITTING POSTURES.

Applying the principles of the **zero gravity position**, **Indian anthropometric dimensions** and **design elements of the chaise lounge chair**, the structure given bellow was developed to be the foundational skeleton for further development of the chair design. This new design, designated as Type 1, draws inspiration from both the zero gravity concept and the ergonomic features of the chaise lounge chair. It serves as the blueprint upon which the final form of the chair will be crafted, combining elements of comfort, functionality, and aesthetic appeal derived from these two influential design concepts.

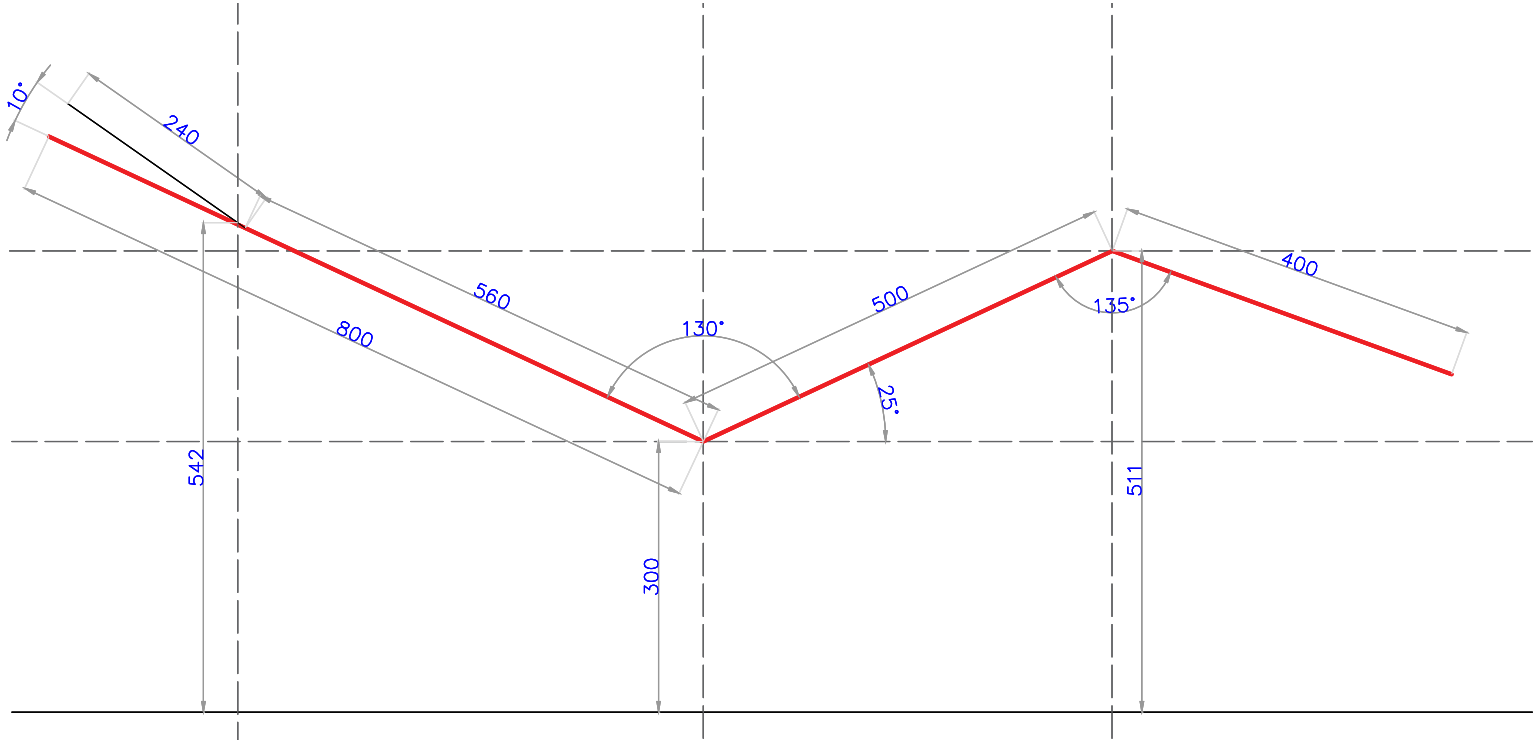


Illustration 80 : Blue print of the final chair structure
Source: Author

SITTING POSTURES

Illustration 81 : Sitting postures sketches
Source: Author

2.4 IDEATION SKETCHES - 1

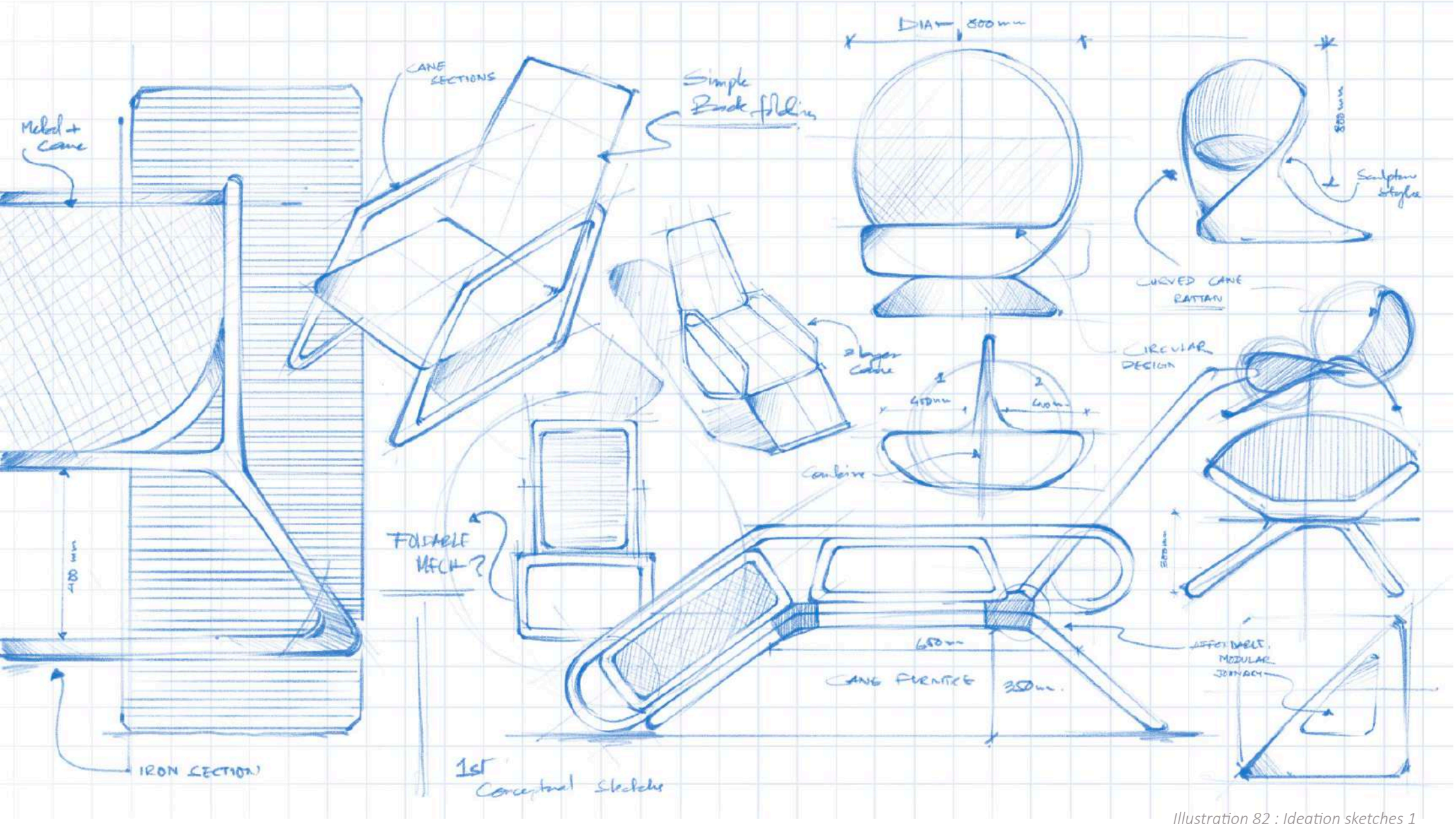


Illustration 82 : Ideation sketches 1
Source: Author

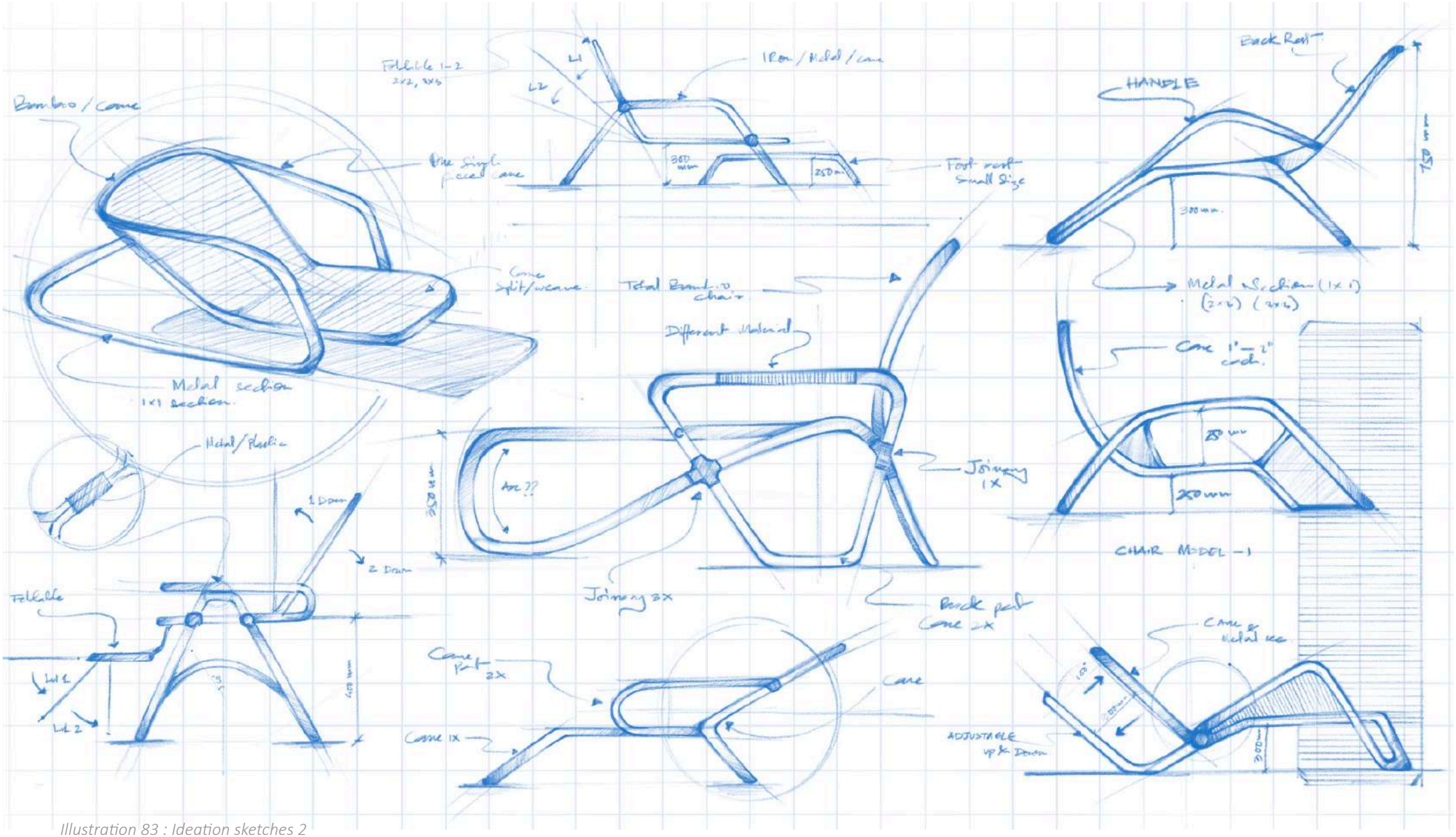


Illustration 83 : Ideation sketches 2
Source: Author

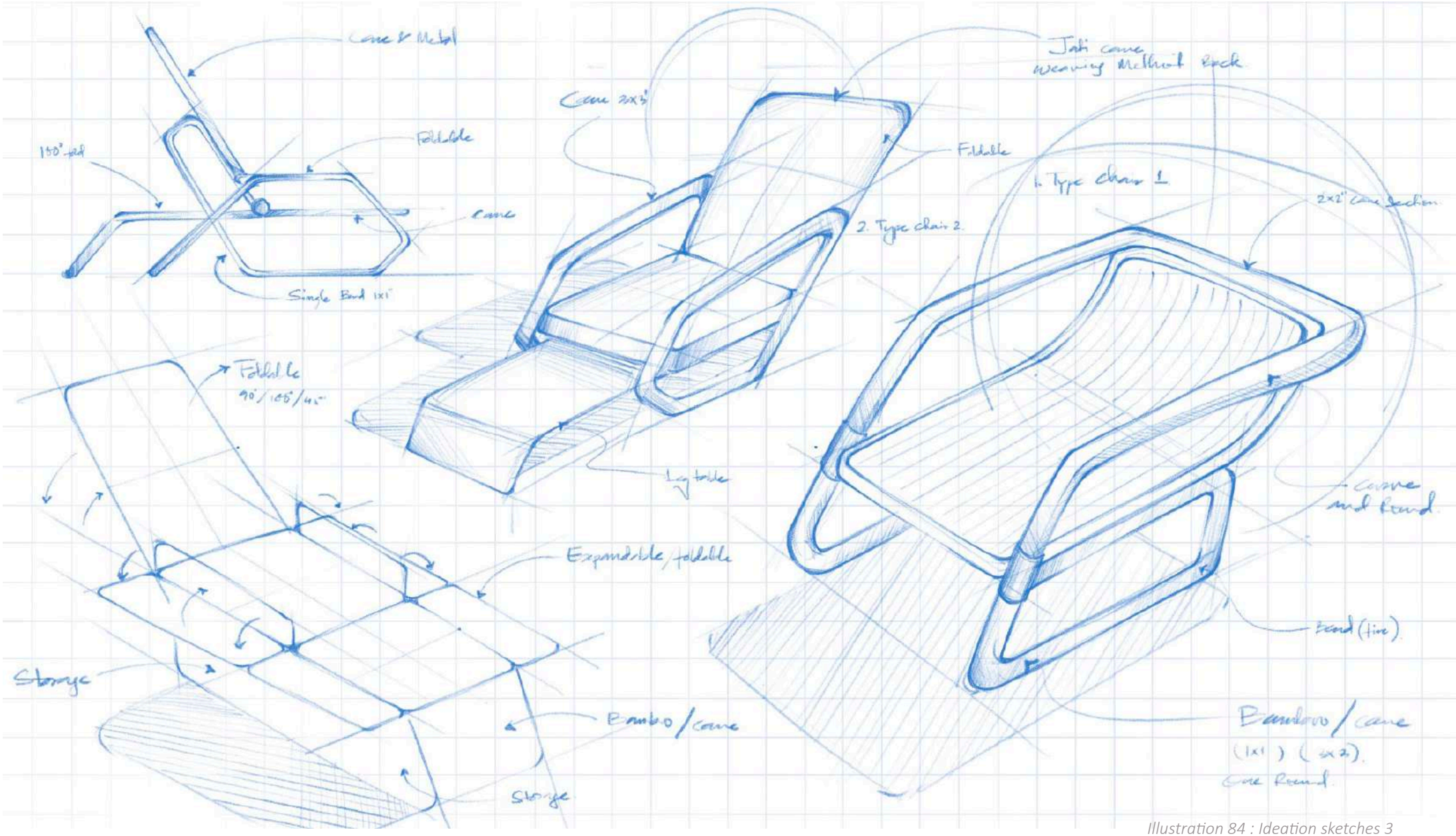


Illustration 84 : Ideation sketches 3
Source: Author

2.5 IDEATION SKETCHES - 2

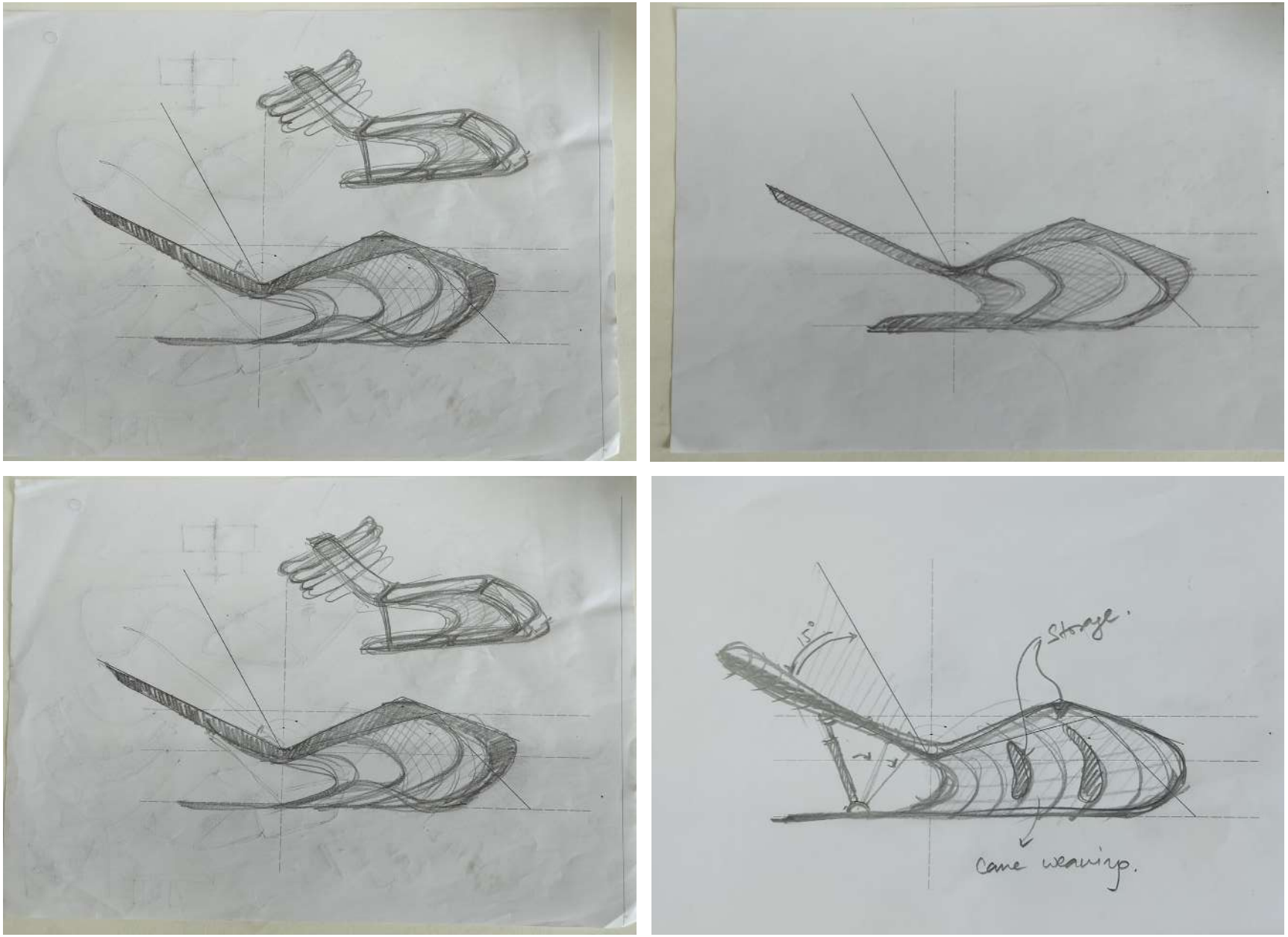


Illustration 85 : Ideation sketches 4
Source: Author

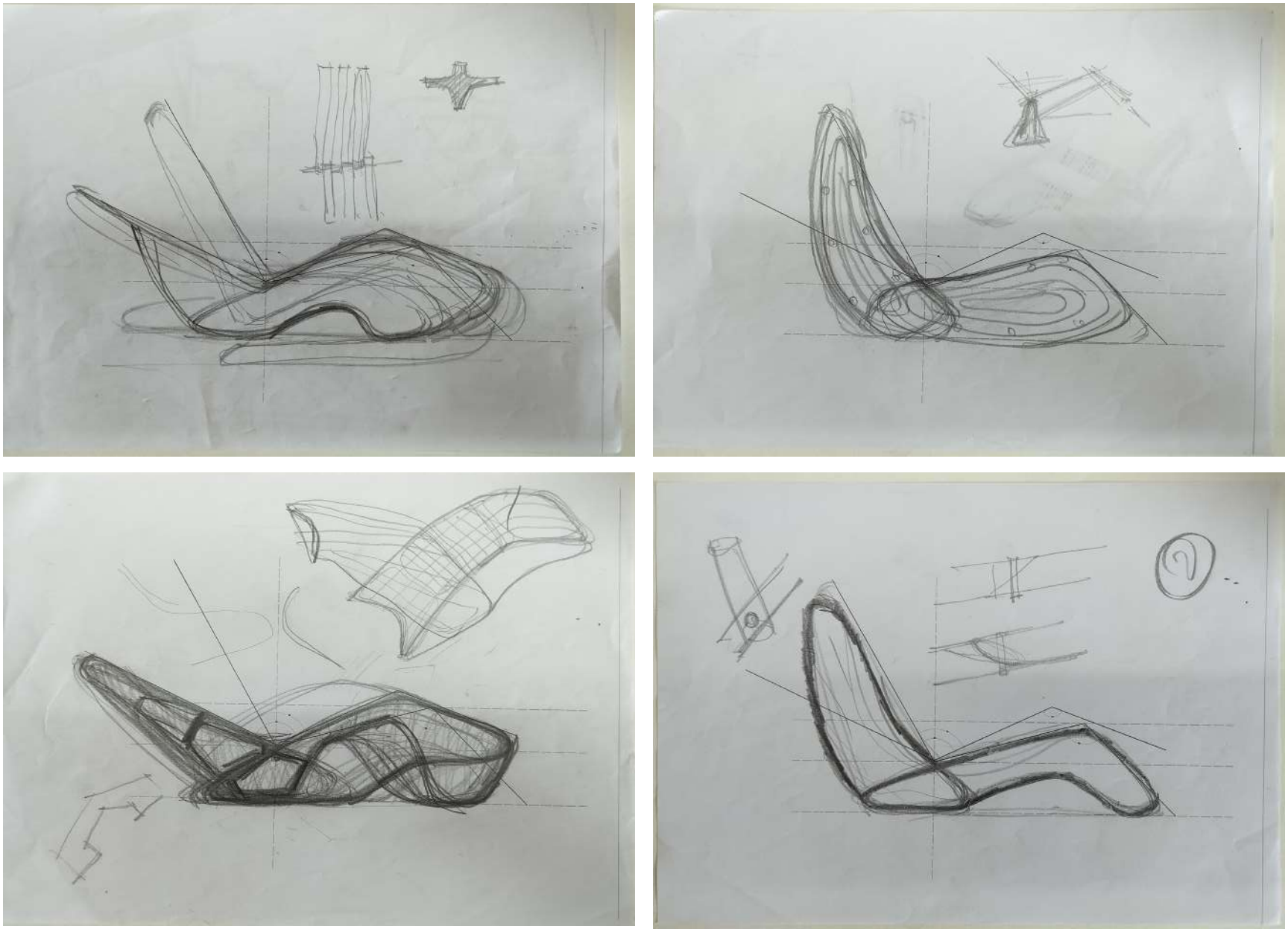


Illustration 86: Ideation sketches 5
Source: Author

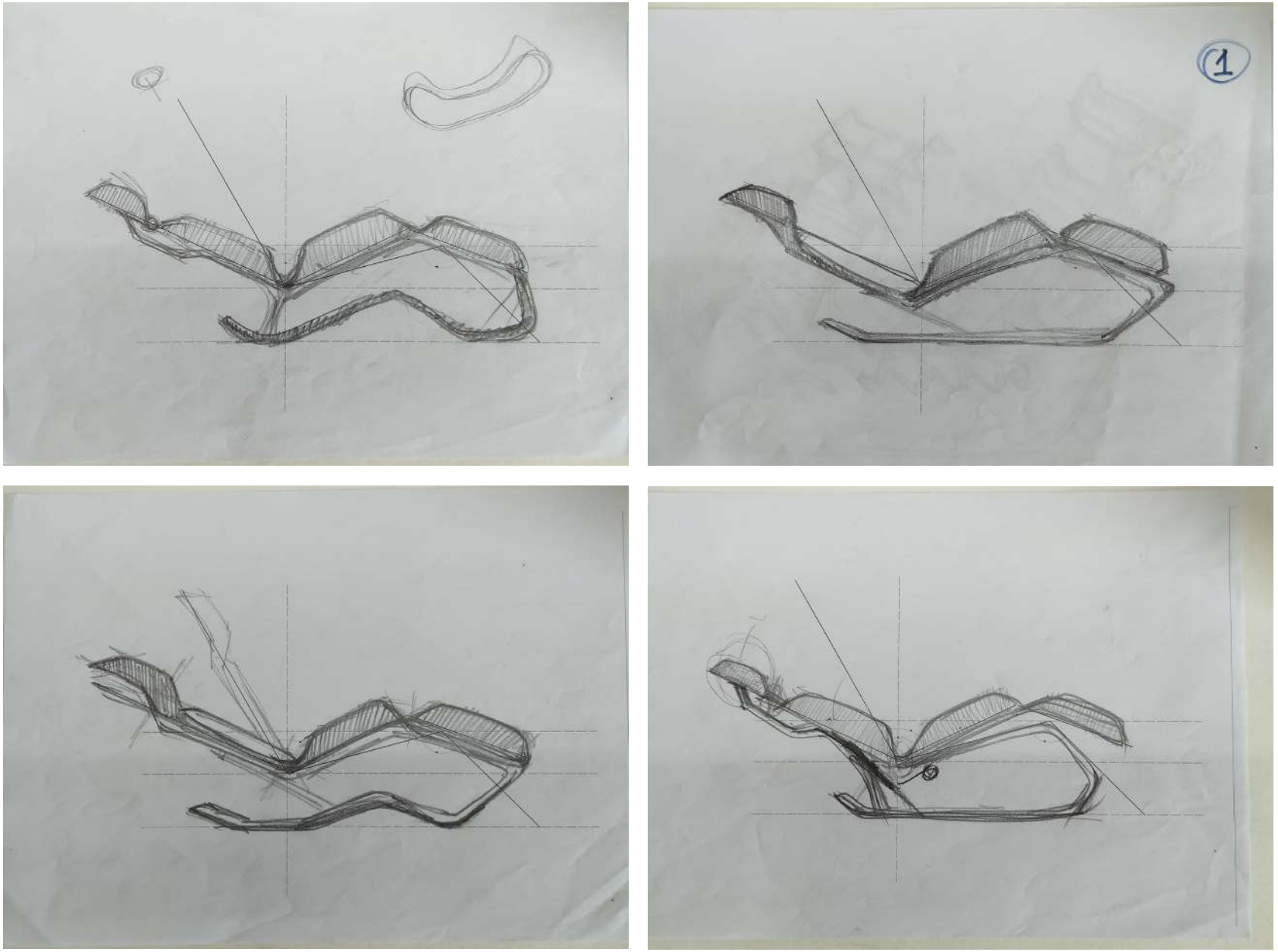


Illustration 87 : Ideation sketches 6
Source: Author

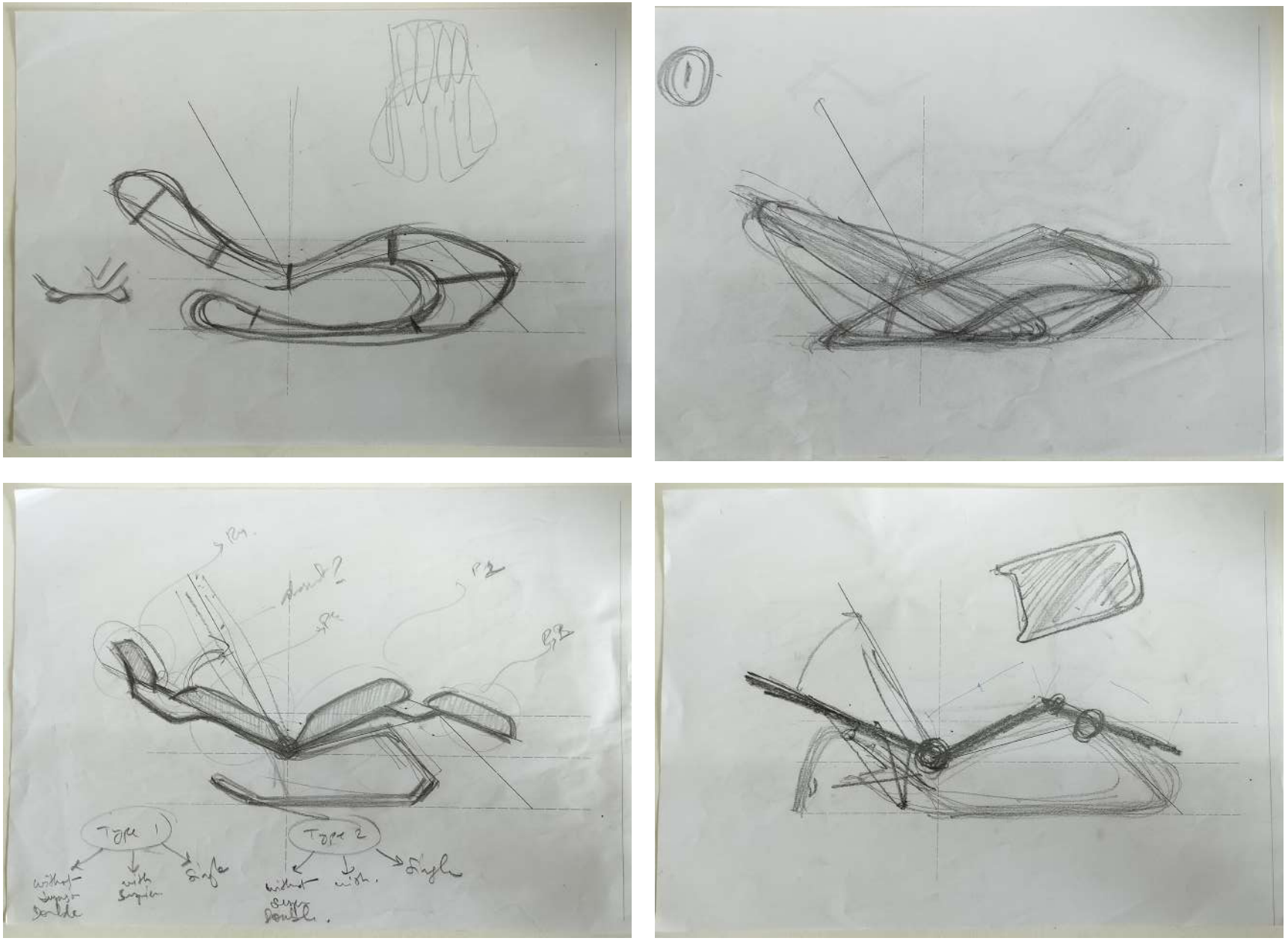


Illustration 88: Ideation sketches 7
Source: Author

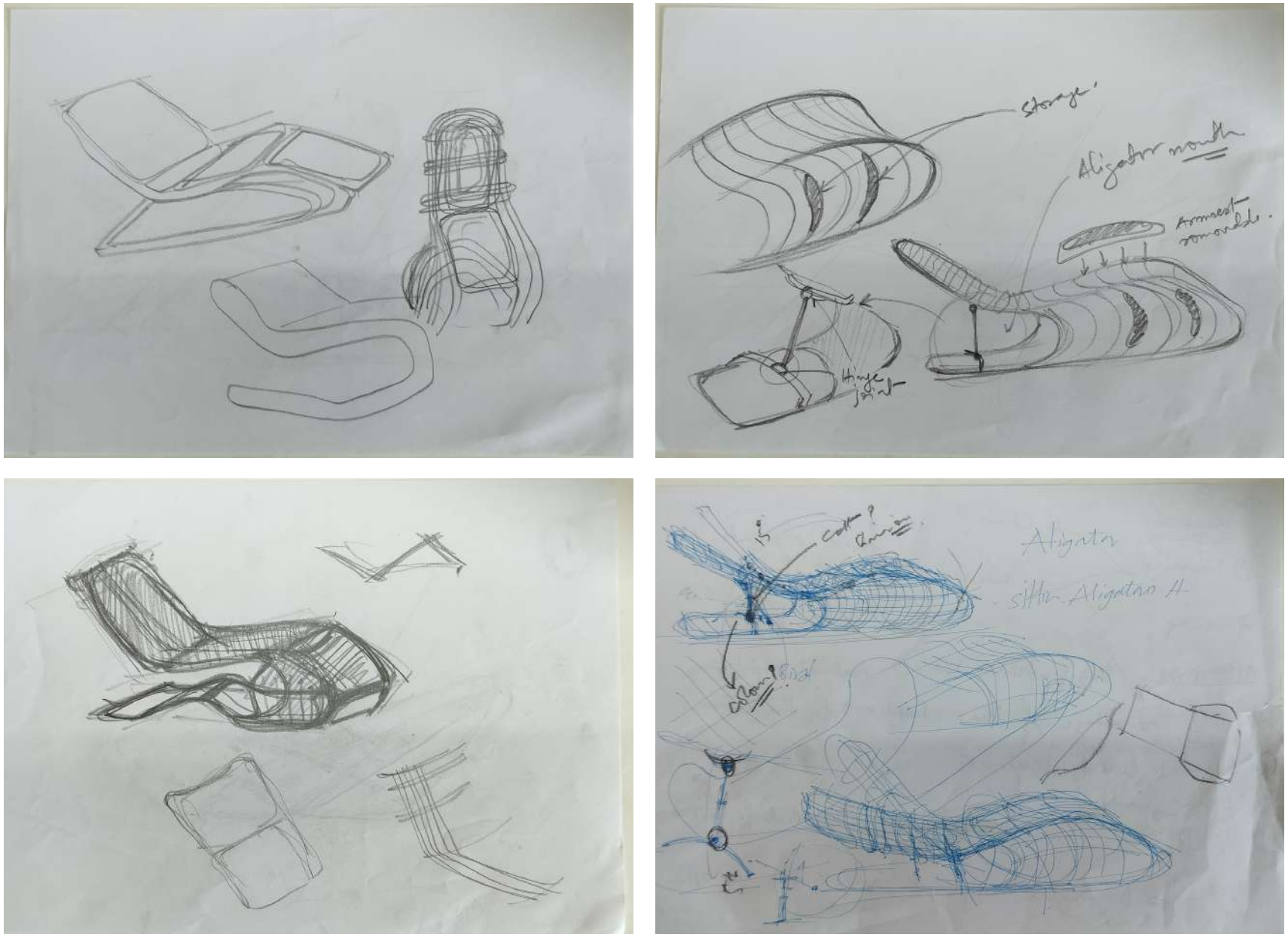
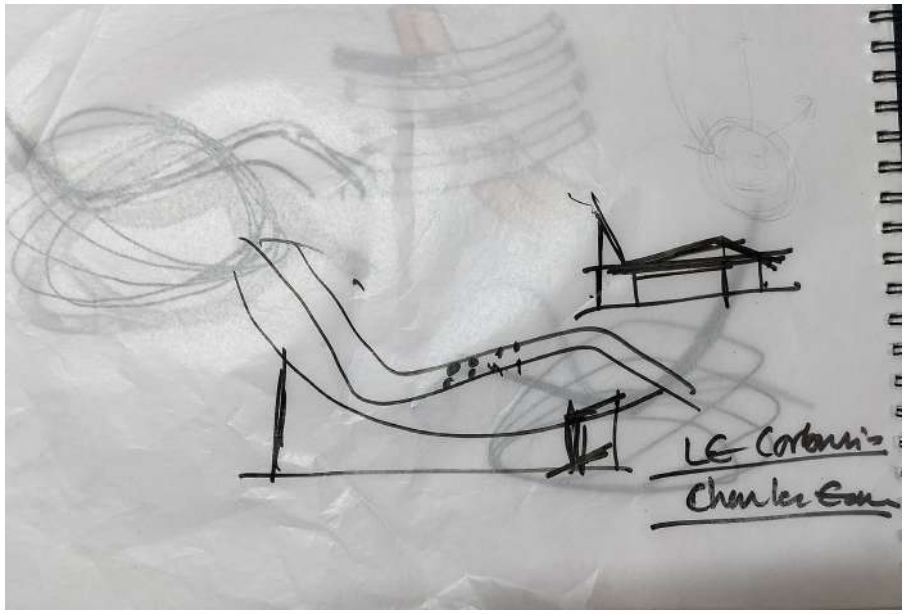
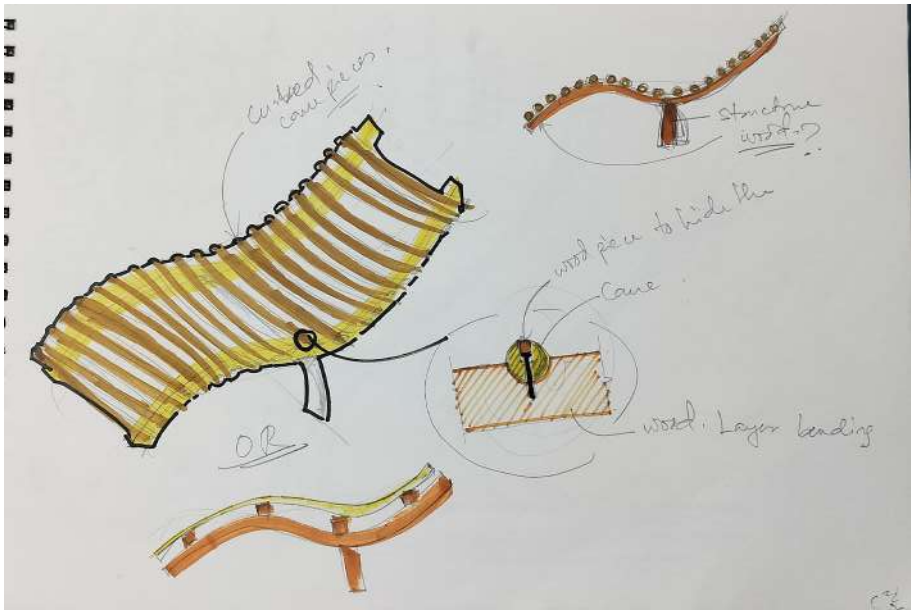
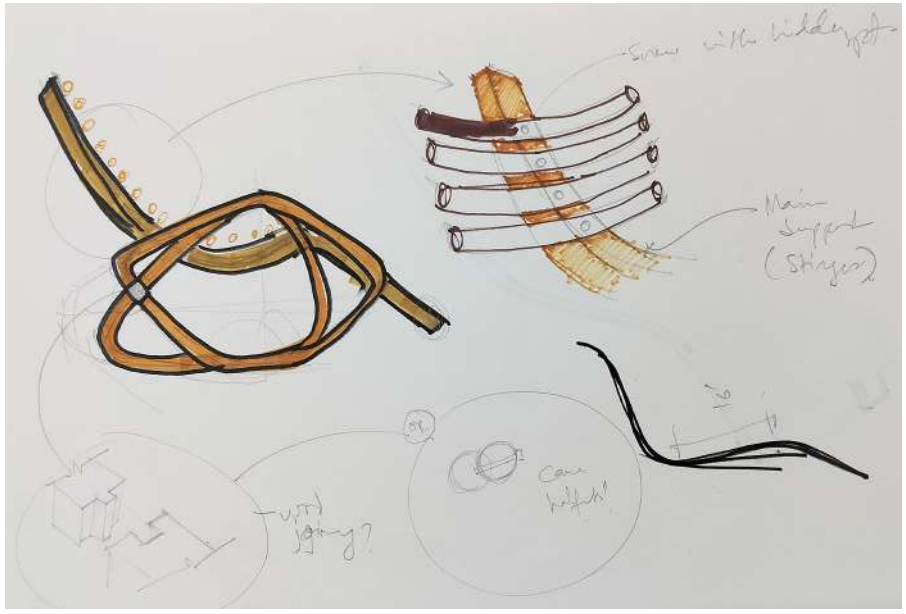


Illustration 89 : Ideation sketches 8
Source: Author







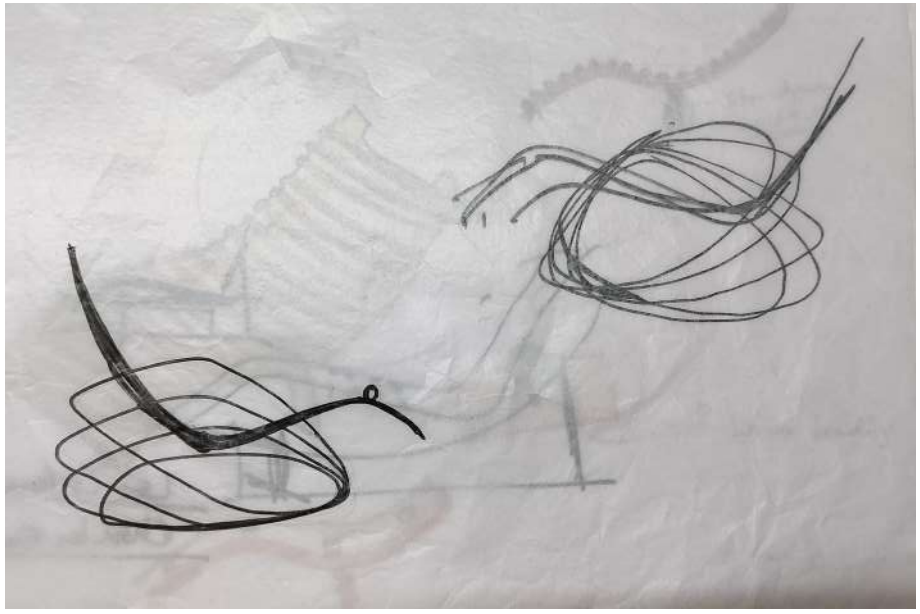


Illustration 90 : Ideation sketches 9
Source: Author

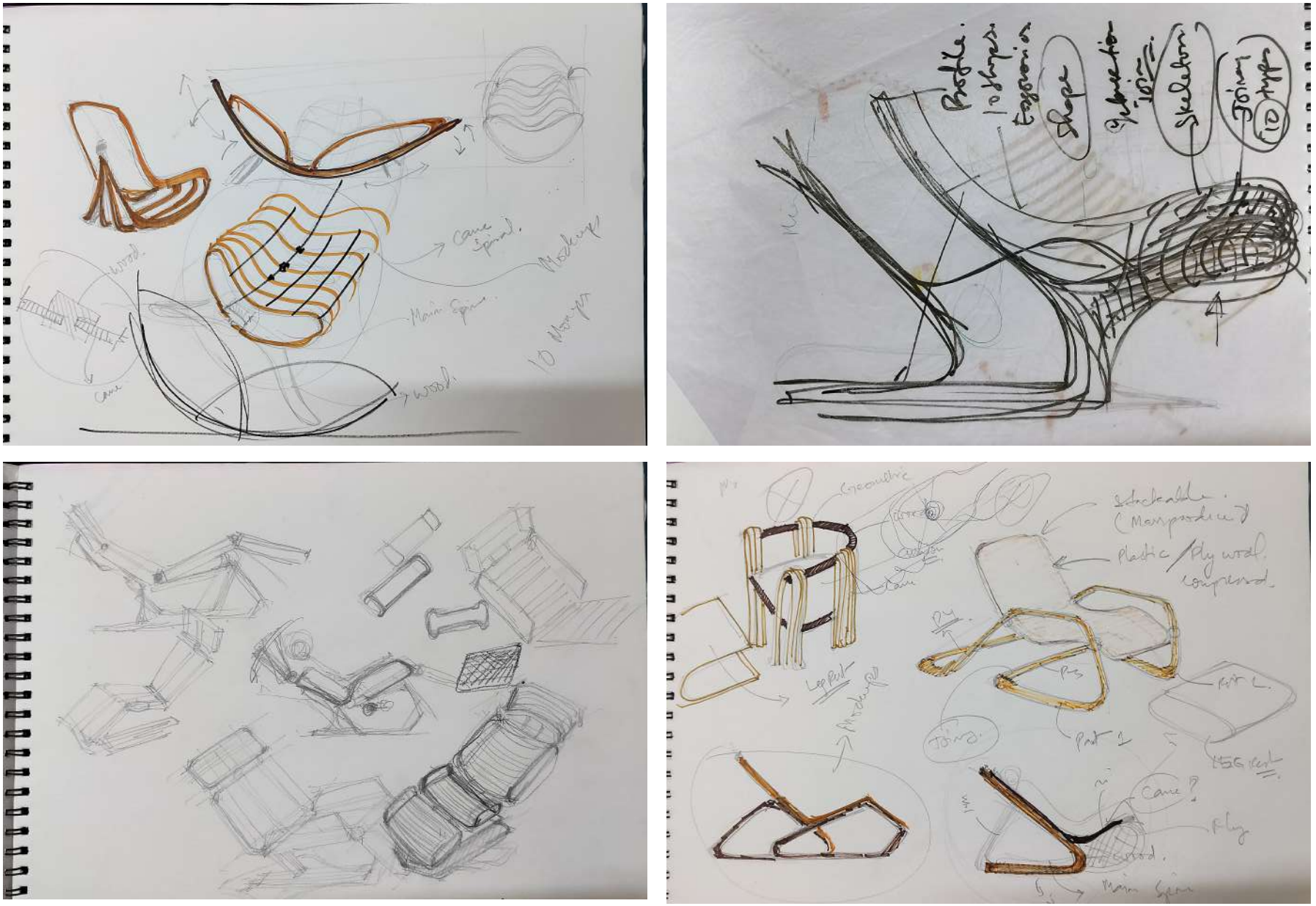


Illustration 90 : Ideation sketches 9
Source: Author

2.5 MOCK UP MODELS

MOCK UP -1

The initial prototype was conceptualized with a chaise lounge chair in mind, adhering closely to the blueprint of the final chair structure. Crafted from 2mm aluminum wire, this first mock-up primarily aimed to delve into various forms and shapes.

Material: Aluminum wire
Scale: 1:8

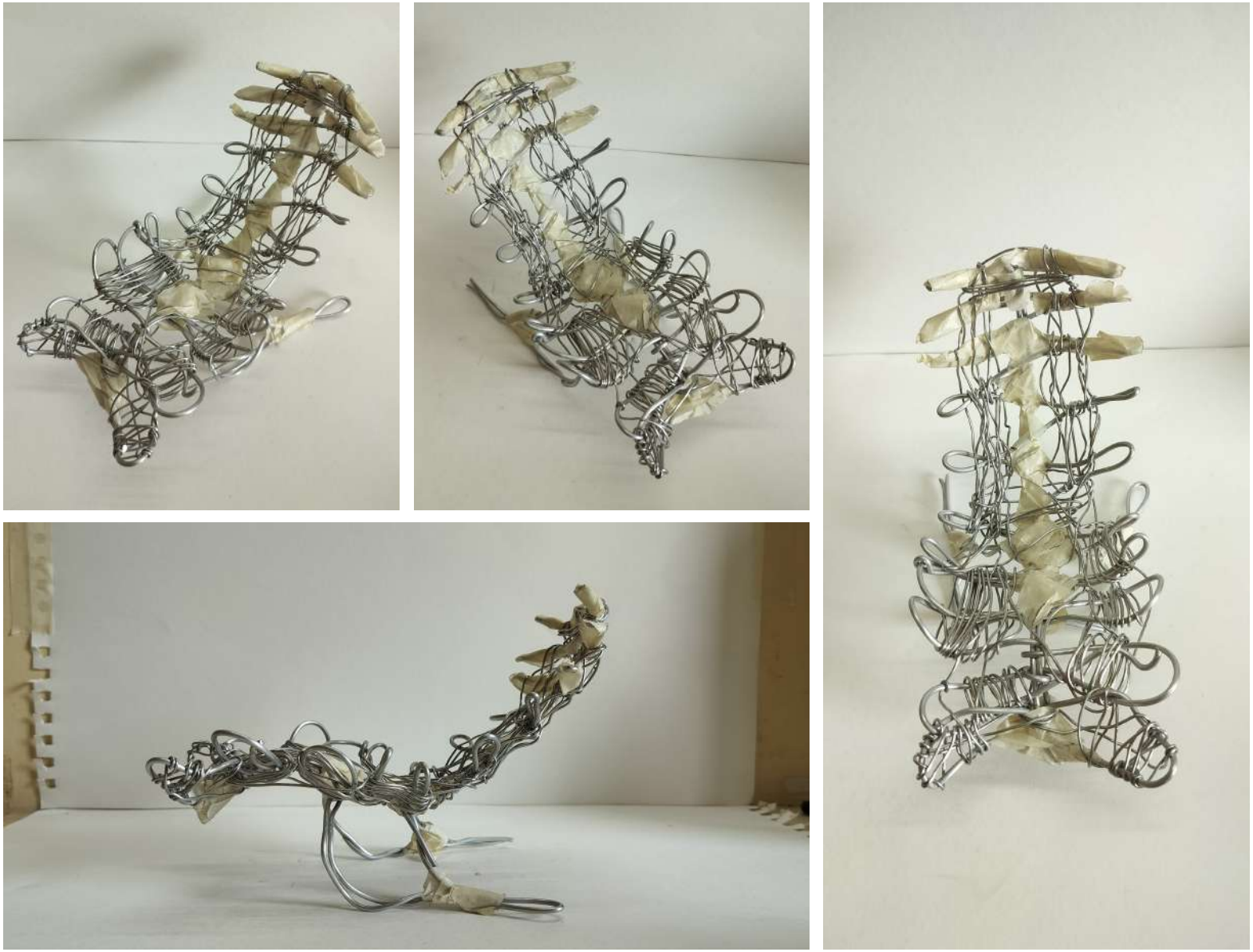


Illustration 91 : Mock up model 1
Source: Author

MOCK UP -2

The second mock-up model adopted a straightforward recliner position, departing from the chaise lounge chair form. Designed with a simple and conventional chair style in mind, it served as a comparative study of the design structure and form in contrast to the first prototype.

Material: Aluminum wire

Scale: 1:8

Illustration 92 : Mock up model 2
Source: Author

MOCK UP -3

The third mock-up expanded upon the initial design concept of the chaise lounge chair, adhering closely to its blueprint. Diverging from traditional designs, this iteration omitted side armrests, prioritizing immediate comfort for the body while also serving as an integral part of the ongoing exploration of form.

Material: Aluminum wire

Scale: 1:8

Illustration 93 : Mock up model 3
Source: Author

MOCK UP -4

The fourth mock-up was a refinement of the recliner chair concept, building upon previous iterations while maintaining the blueprint's integrity. Departing from the chaise lounge chair form, this design prioritized the comfort and functionality typically associated with recliners. With careful consideration, this iteration omitted unnecessary elements to streamline the design, focusing on optimizing relaxation and ergonomics.

Material: Aluminum wire
Scale: 1:8

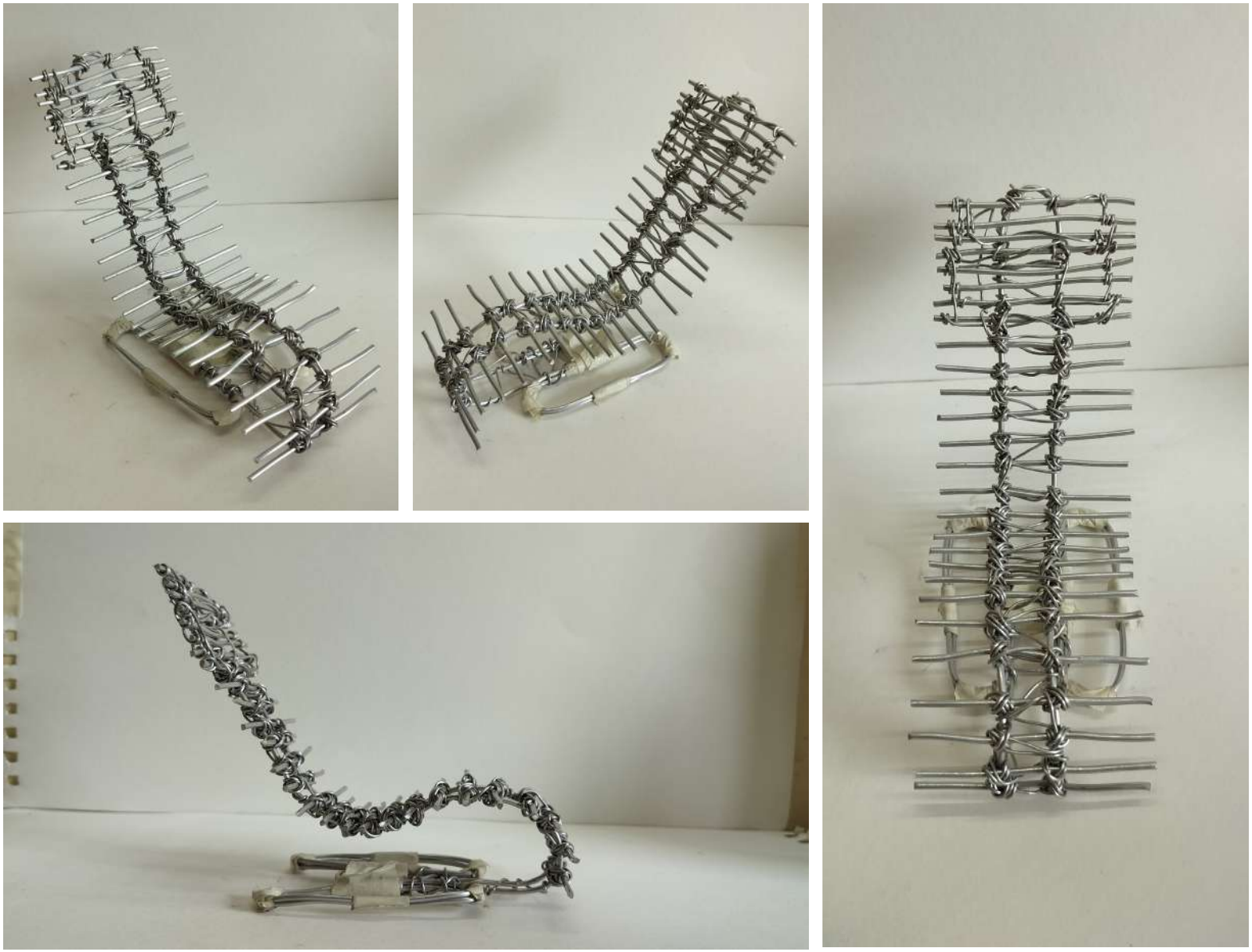


Illustration 94 : Mock up model 4
Source: Author

MOCK UP -5

The fifth mock-up marked a return to traditional styling, incorporating side armrests into the recliner chair design. This iteration seamlessly blended classic elements with modern functionality, following the blueprint's guidelines while introducing familiar features for added comfort and aesthetics. With attention to detail, this mock-up aimed to strike a balance between timeless appeal and ergonomic design, offering a harmonious synthesis of form and function.

Material: Aluminum wire
Scale: 1:8

Illustration 95 : Mock up model 5
Source: Author

MOCK UP -5

In the sixth mock-up, the designer infused the classic recliner structure with innovative elements. Notably, attached strings adorned each side, introducing a dynamic visual and tactile dimension to the chair. Furthermore, a tapering seat at the front not only enhanced the aesthetic appeal but also contributed to a more ergonomic seating experience

Material: Aluminum wire
Scale: 1:8

Illustration 96 : Mock up model 6
Source: Author

2.5 MOCK UP MODELS COMPARATIVE TABLE

To determine the final form of the chair, a comprehensive comparative analysis was conducted among the six earlier mock-ups, considering various criteria crucial to its design. This meticulous evaluation process informed the development of the final chair design, synthesizing insights gleaned from the iterative mock-ups to create a refined, versatile, and comfortable seating solution.

Illustration 97 : Classification of chair style
Source: Author

ANALYSIS PARAMETERS

1.Comfort emerged as a paramount consideration, evaluated meticulously across each iteration to ensure optimal ergonomics and relaxation.

2. Form and stability were scrutinized closely, seeking a harmonious balance between aesthetic appeal and structural robustness.

3. Static and dynamic structures was examined, acknowledging the need for both stability and adaptability in different scenarios.

4. Chair style was assessed, weighing the merits of classic designs against more contemporary interpretations.

5. Simplicity and complexity in crafting was deliberated, aiming to strike a delicate equilibrium between artisanal intricacy and functional simplicity in the final product.

MODEL	COMFORT	FORM & STABILITY	STRUCTURE	STYLE	CRAFTING
	HIGH	MEDIUM	DYNAMIC	CHAISE	HIGH
	MEDIUM	MEDIUM	STATIC	CHAISE	HIGH
	HIGH	HIGH	STATIC	CHAISE	MEDIUM
	MEDIUM	HIGH	DYNAMIC	RECLINER	MEDIUM
	LOW	HIGH	STATIC	RECLINER	LOW
	LOW	HIGH	STATIC	RECLINER	LOW

Illustration 98 : Analysis table
Source: Author

2.6 FINAL MOCK UP MODELS

FINAL MOCK UP - 1

The initial final mock-up adheres closely to the blueprint of the chaise lounge chair structure. Utilizing aluminum wire to simulate cane material, this rendition presents the design in a scaled-down format, facilitating a clearer understanding for viewers. By replicating key structural elements in a smaller scale, this mock-up provides valuable insights into the form and function of the final design, allowing for precise evaluation and refinement before proceeding to full-scale production.

Material: Aluminum wire
Scale: 1:8

Illustration 99 : Final mock up 1
Source: Author

FINAL MOCK UP - 2

The second final mock-up introduces a distinctive feature: a covered body encompassing the entirety of the chair, with exposed legs showcasing a singular, unified structure. This design choice elevates the aesthetics of the chair, creating a seamless visual flow from the seat to the legs. By encasing the body in a covering material, attention is drawn to the sleek lines and cohesive design of the chair, while the exposed legs serve as a focal point, highlighting the integrity and elegance of the single-piece leg structure.

Material: Aluminum wire
Scale: 1:8

Illustration 100 : Final mock up 2
Source: Author

FINAL MOCK UP - 3

In the third final mock-up, there was a departure from the original cane material concept, shifting instead towards the utilization of plywood for chair construction. This iteration featured a segmented design, with distinct sections allocated for each part of the body: legs, thighs, upper torso, and head. However, despite its structural innovation, this deviation from the cane material ultimately led to the decision to discard this design.

Material: Sunboard 2mm
Scale: 1:8

Illustration 101 : Final mock up 3
Source: Author

FINAL MOCK UP - 4

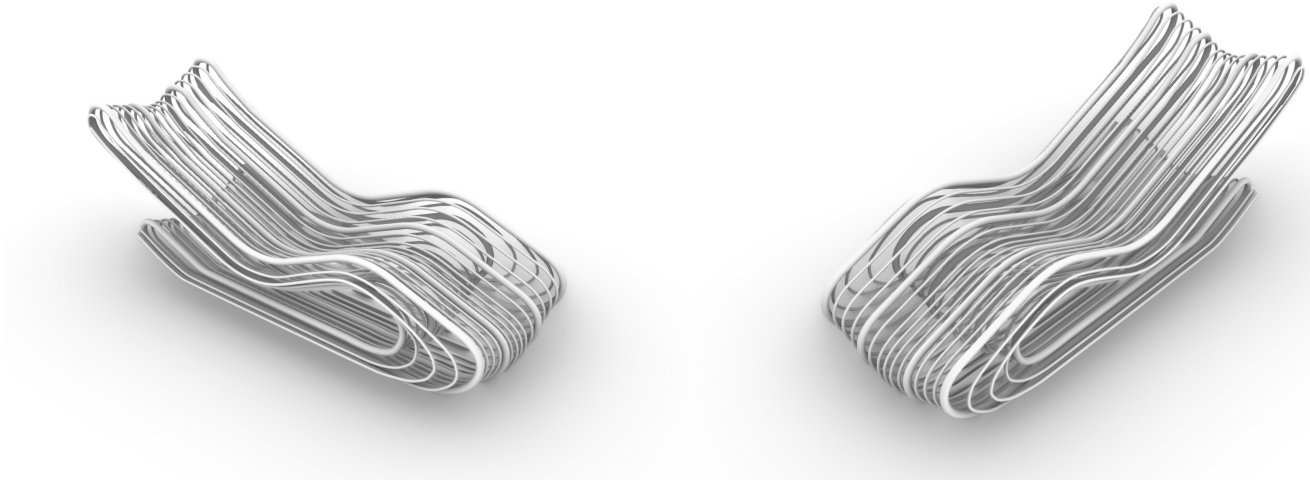
The design was meticulously crafted to accentuate the intricate weaving techniques and the natural allure of this material. Notably, the front portion of the chair was deliberately fashioned to be bold and dominant, serving as a canvas to showcase the meticulous weaving and exquisite craftsmanship. This deliberate emphasis on the aesthetic appeal and tactile quality of cane underscored the commitment to honoring the material's inherent elegance, resulting in a final iteration that seamlessly blends artistry with functionality.

Material: Sunboard 2mm

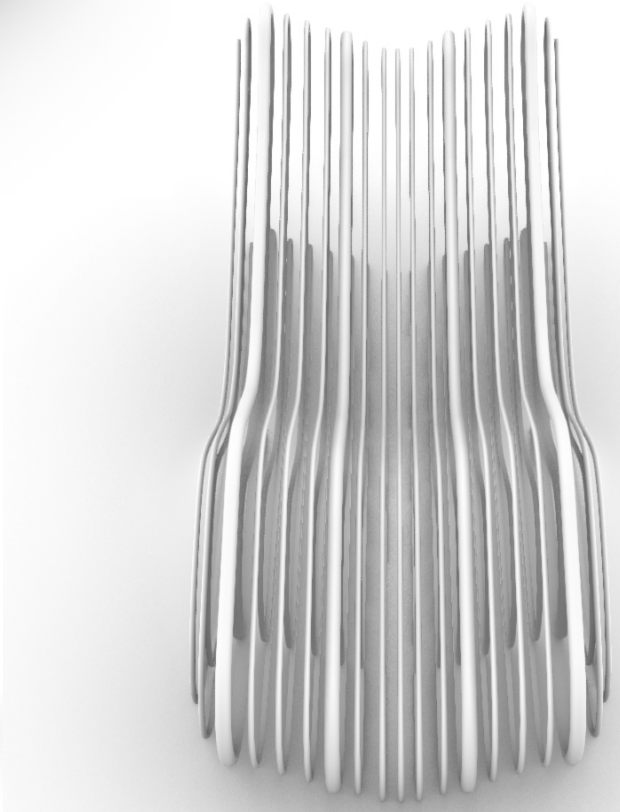
Scale: 1:8

Illustration 102 : Final mock up 4
Source: Author

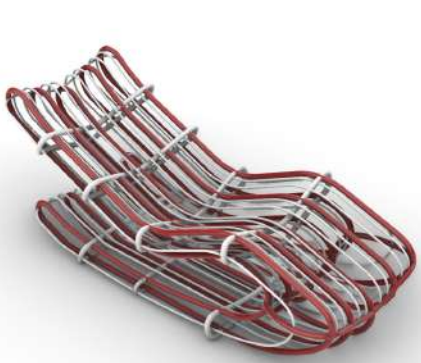
2.8 FINAL IDEATION AND CONCEPTS

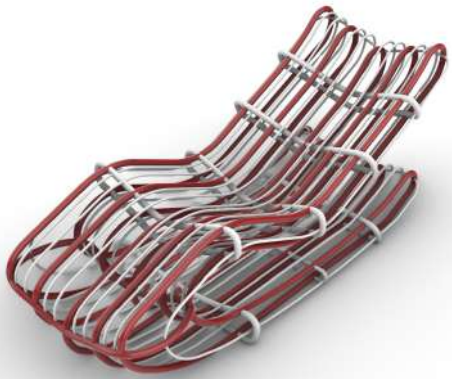


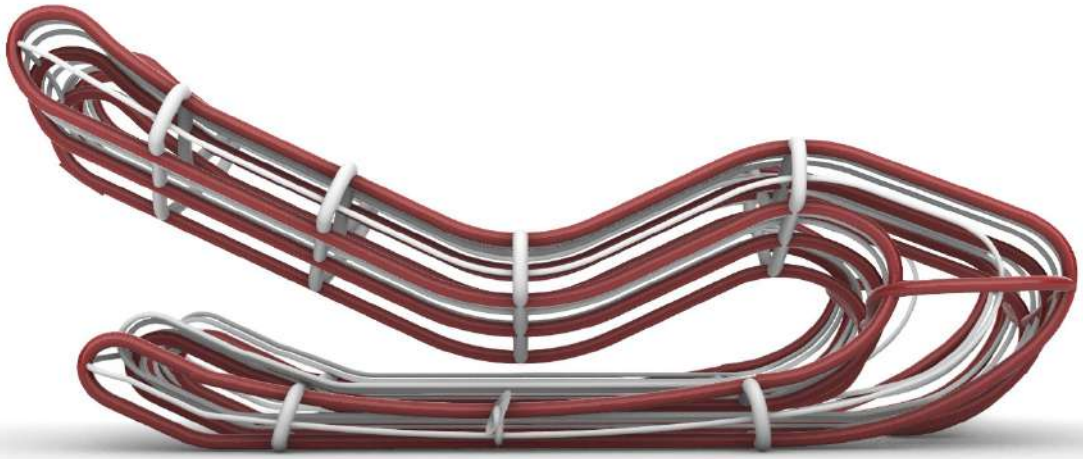
3D MODEL - 1



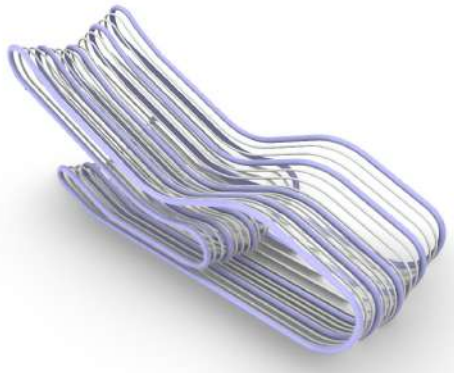
3D MODEL - 2

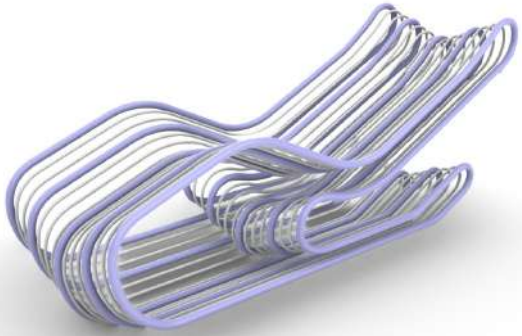


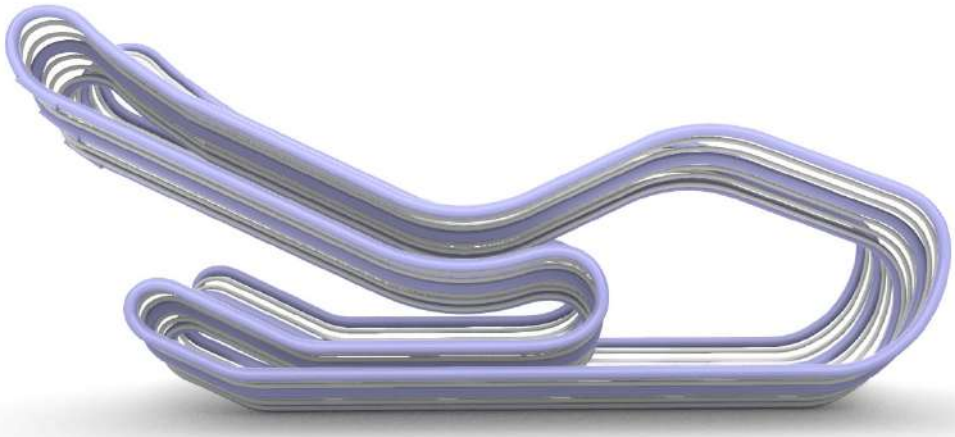


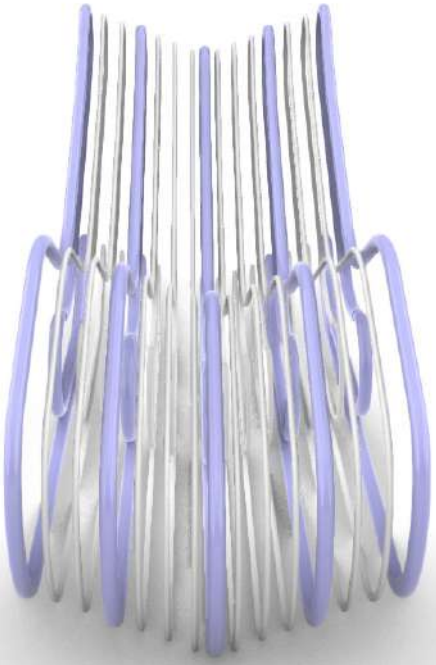


3D MODEL - 3

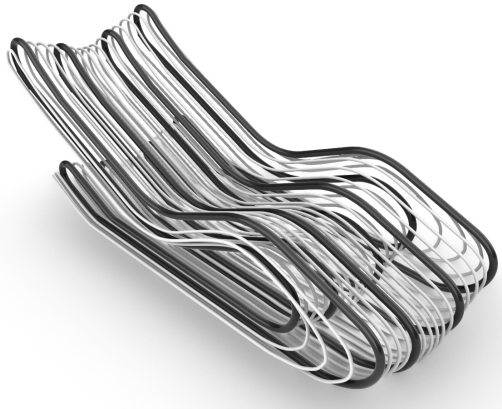


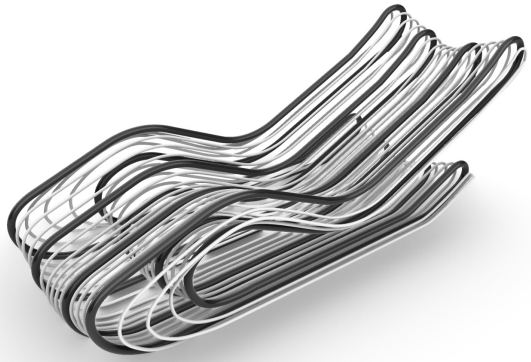




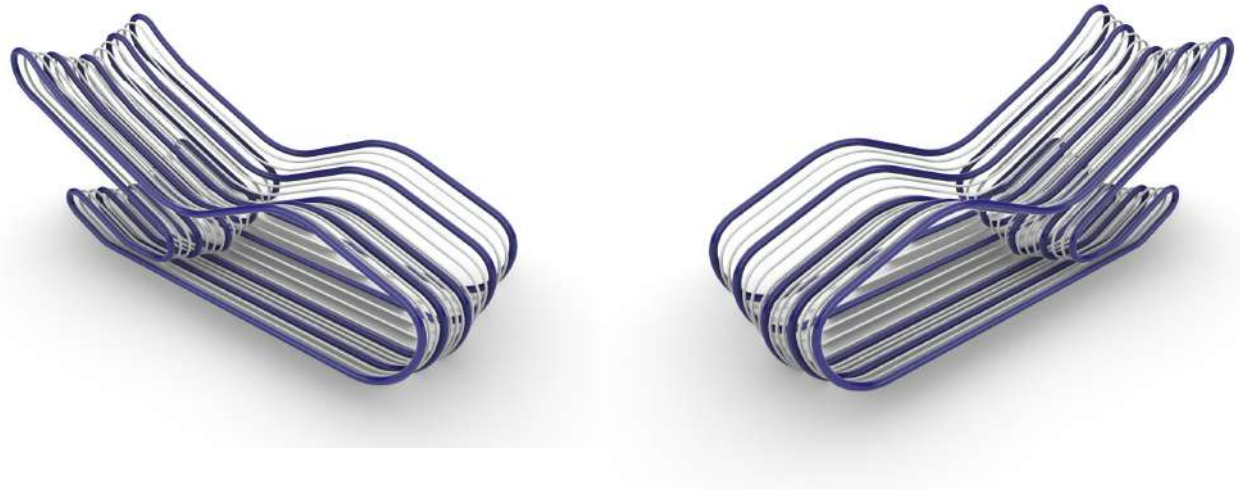


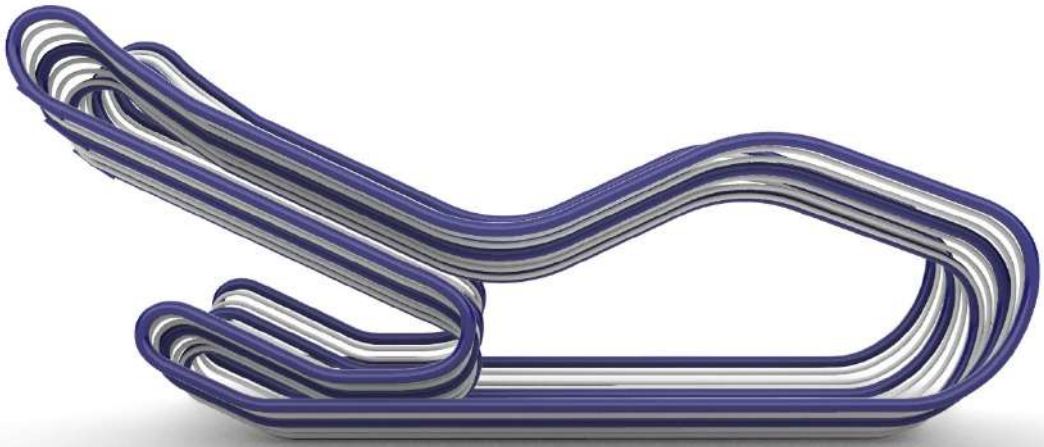
3D MODEL - 4

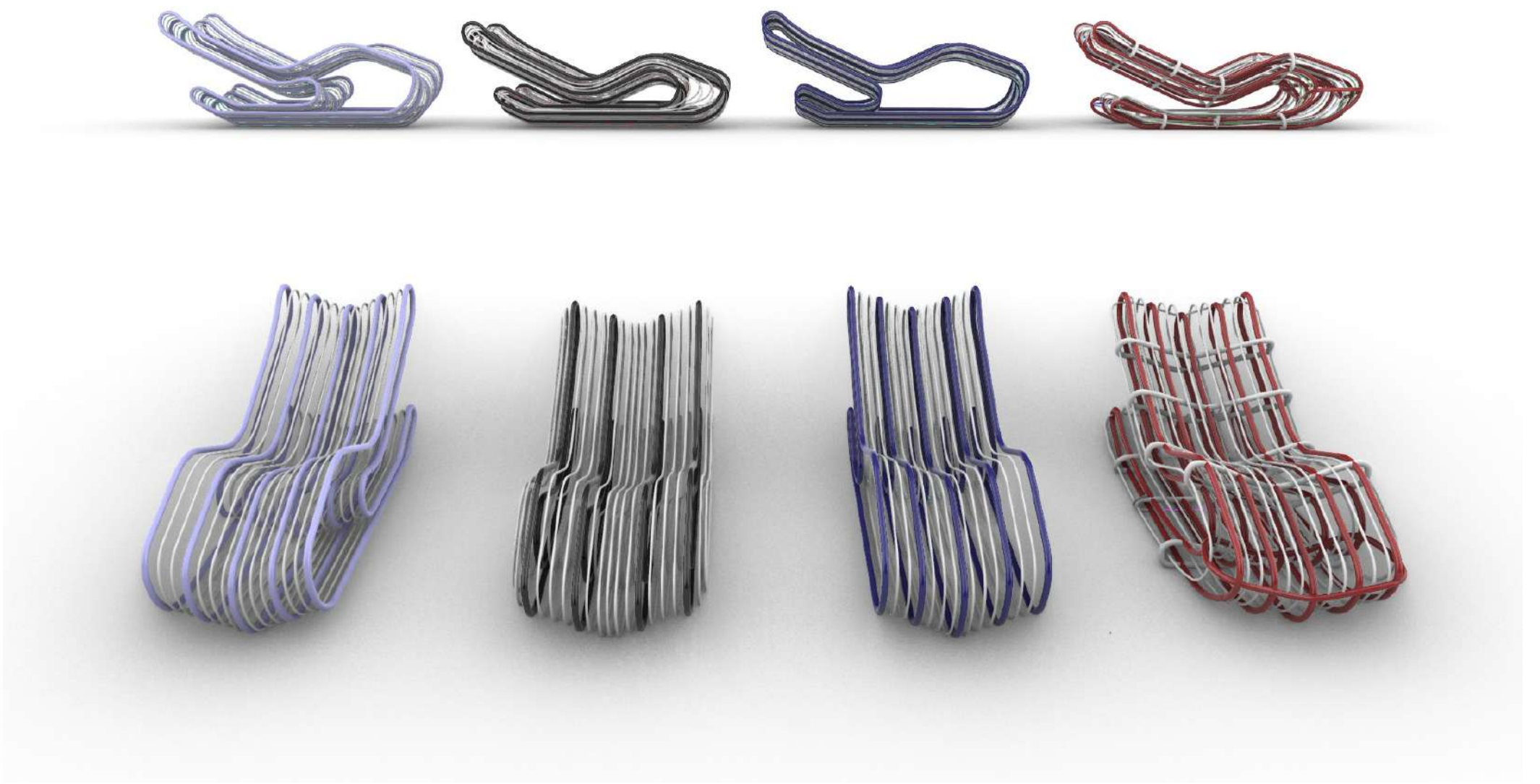


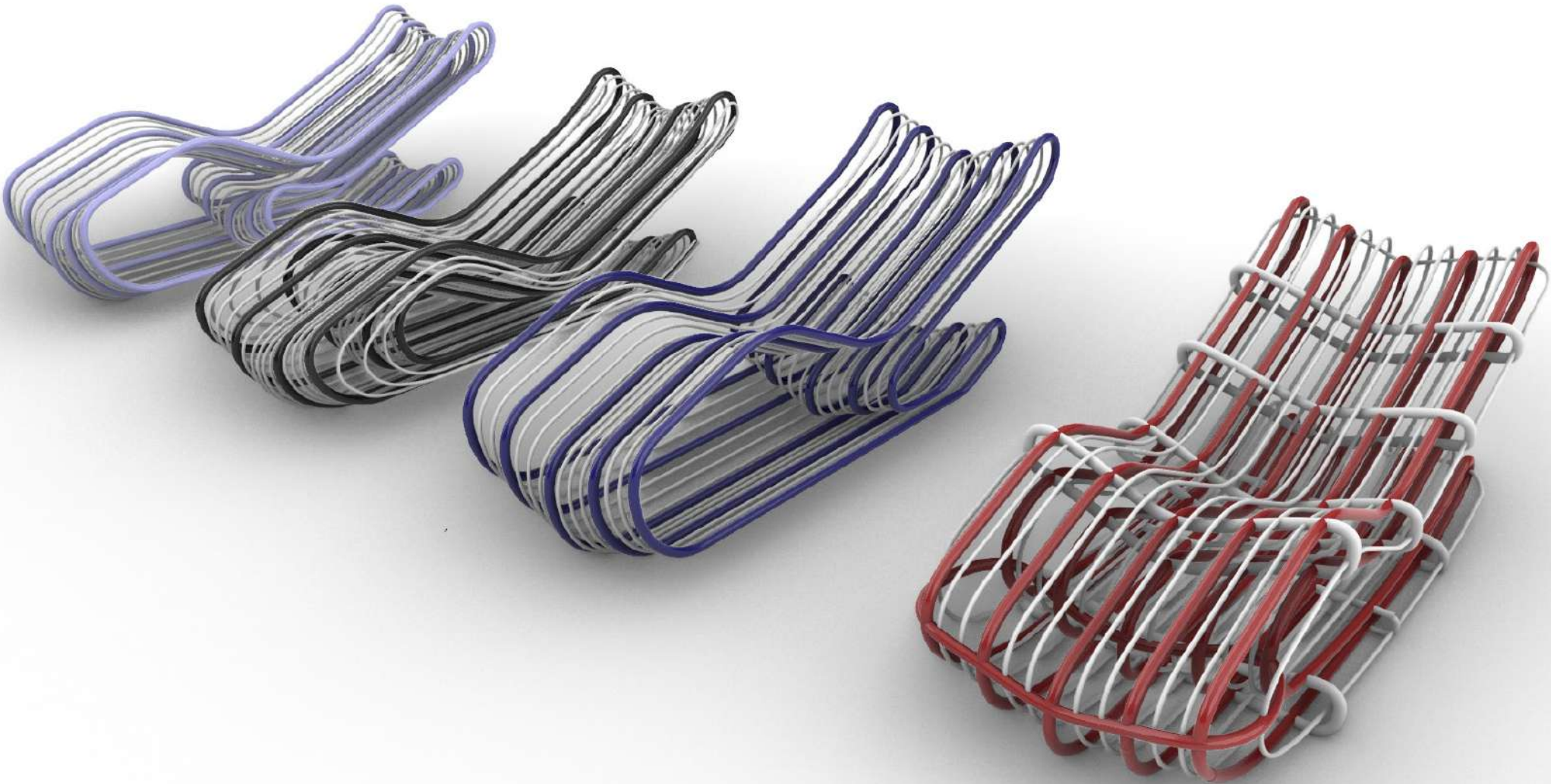


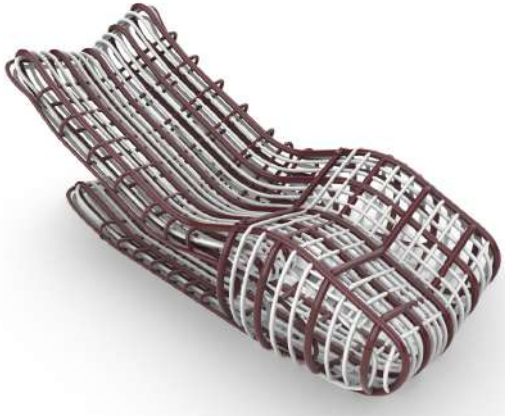
3D MODEL - 5

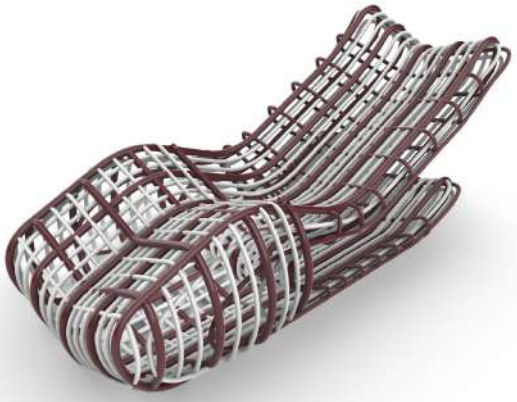




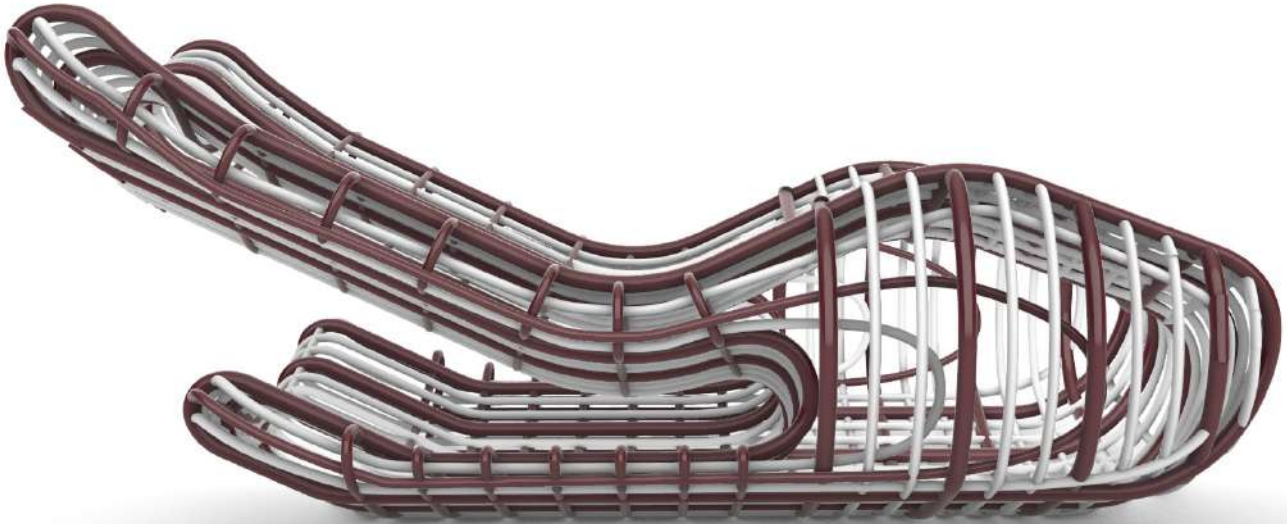


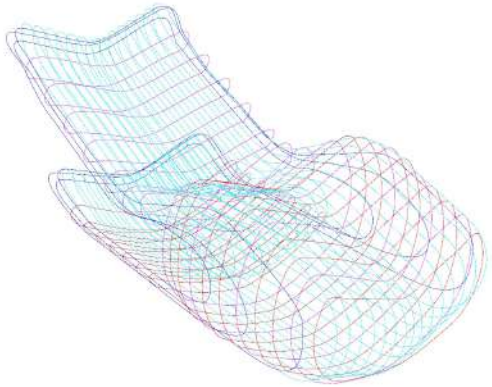


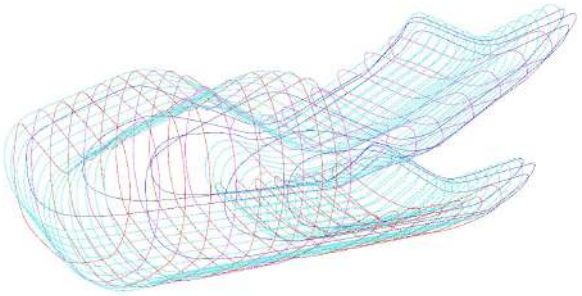




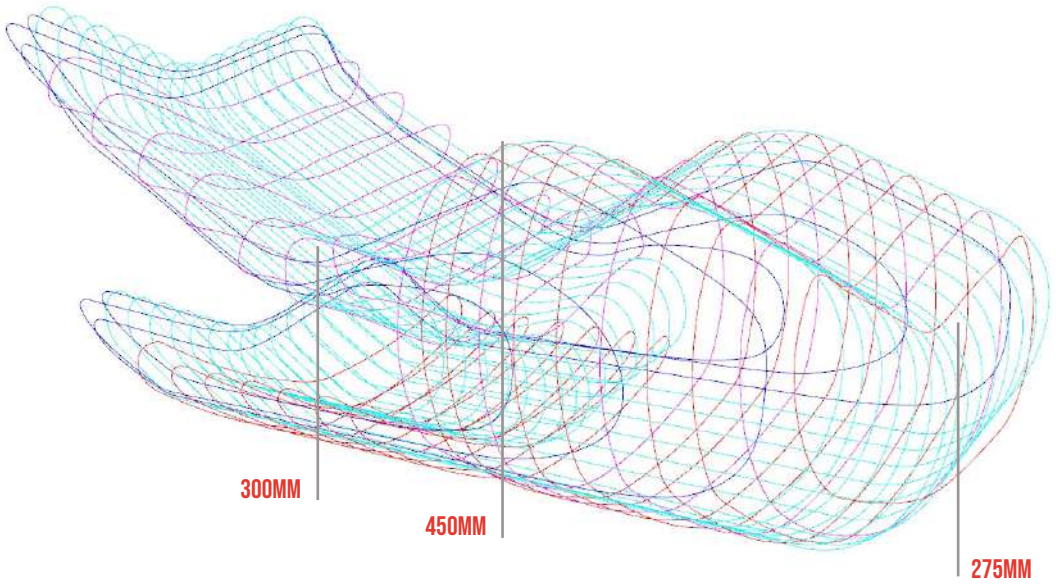
FINAL MODEL

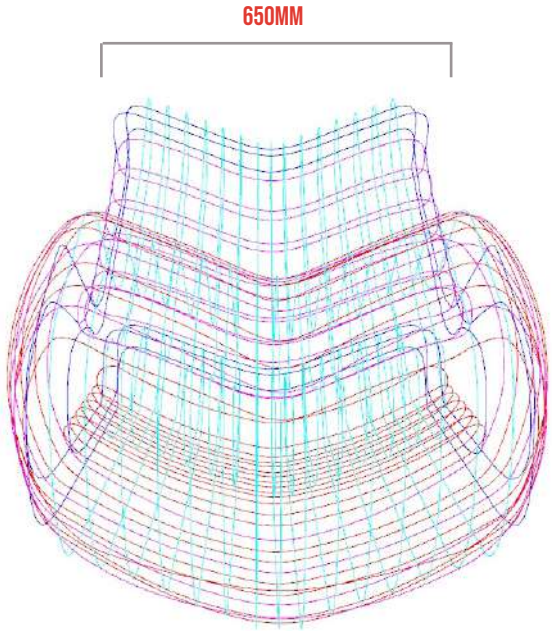






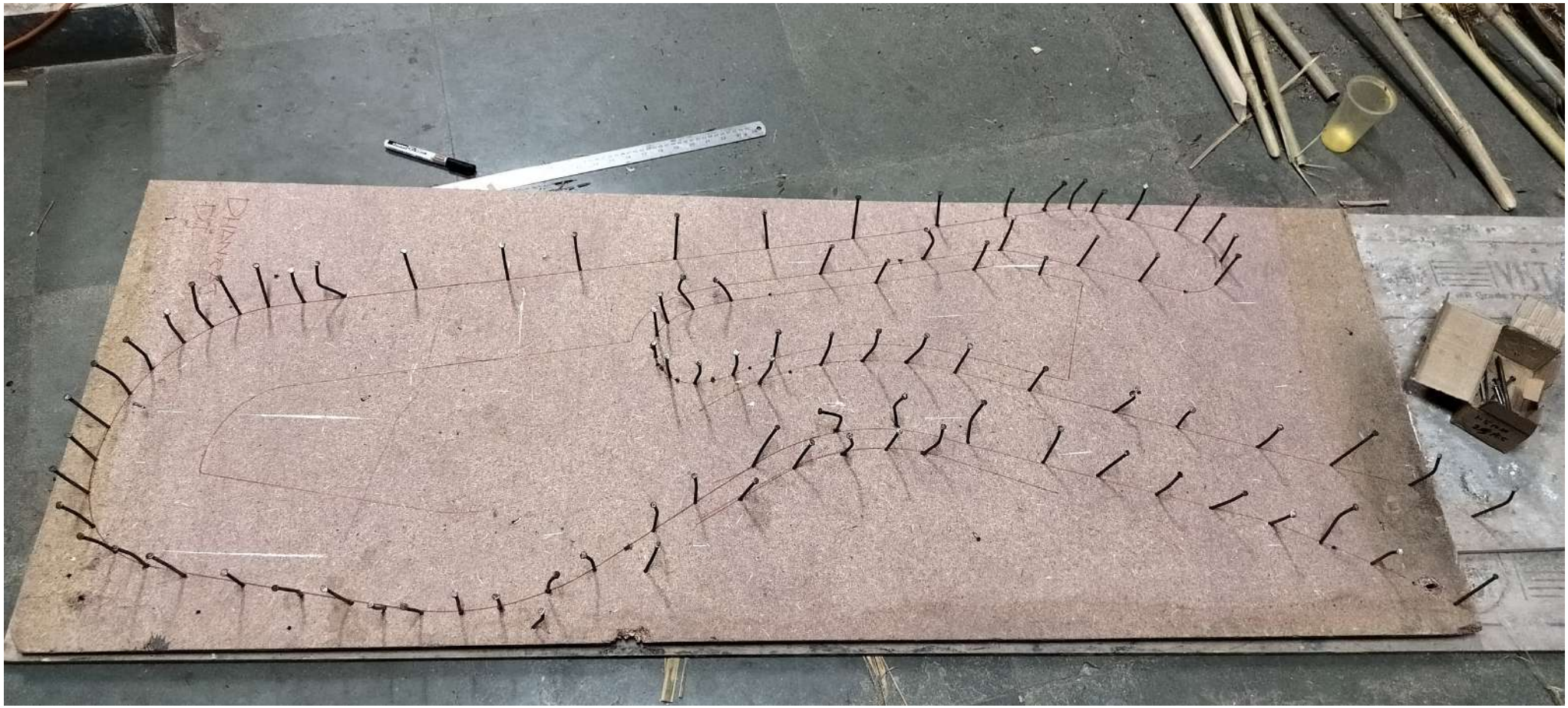
3D MODEL - 6 (WIRE FRAME)





2.9 FINAL DESIGN

PHYSICAL MODEL MAKING PROCESS



CHAIR MAOULD - MDF BOARD AND NAIL

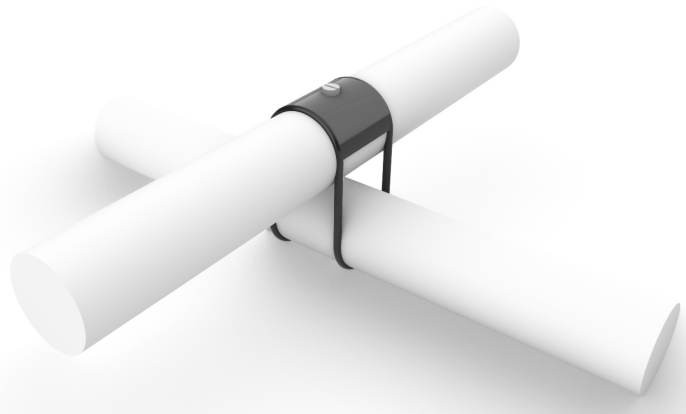

15.9

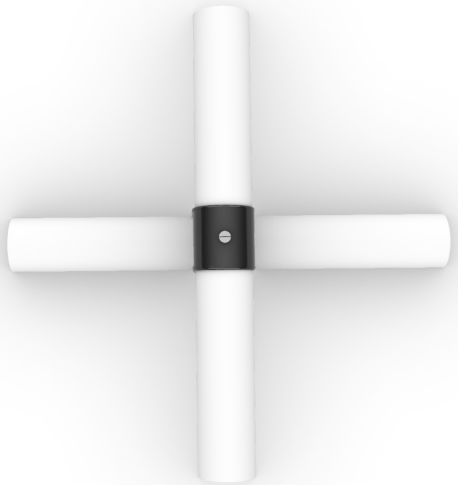

WHITE BOARD MARKER

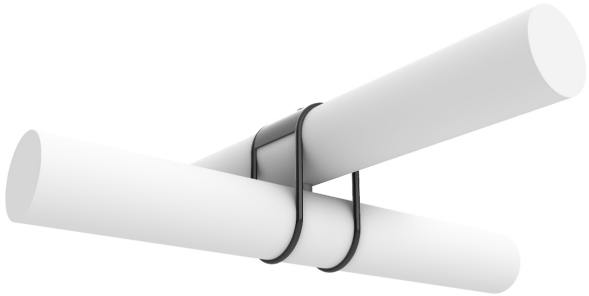

AVENGERS
ASSEMBLE

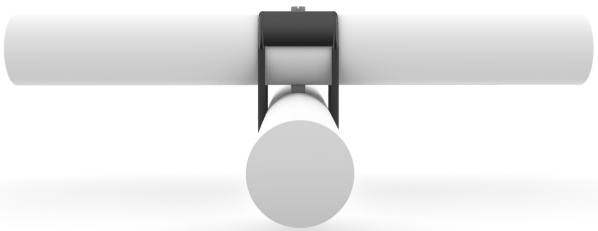
JOINERY DETAILS

INSPIRED FROM “C” CLAMPS

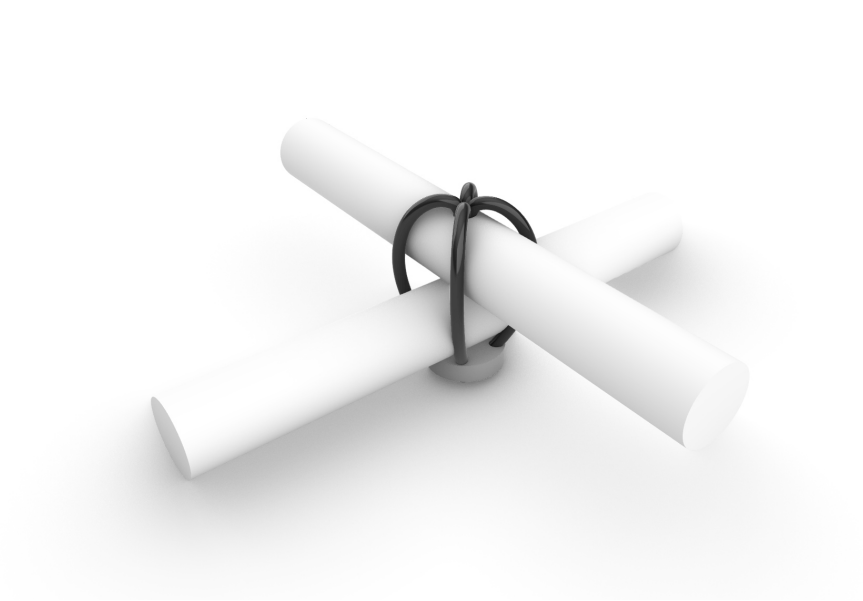


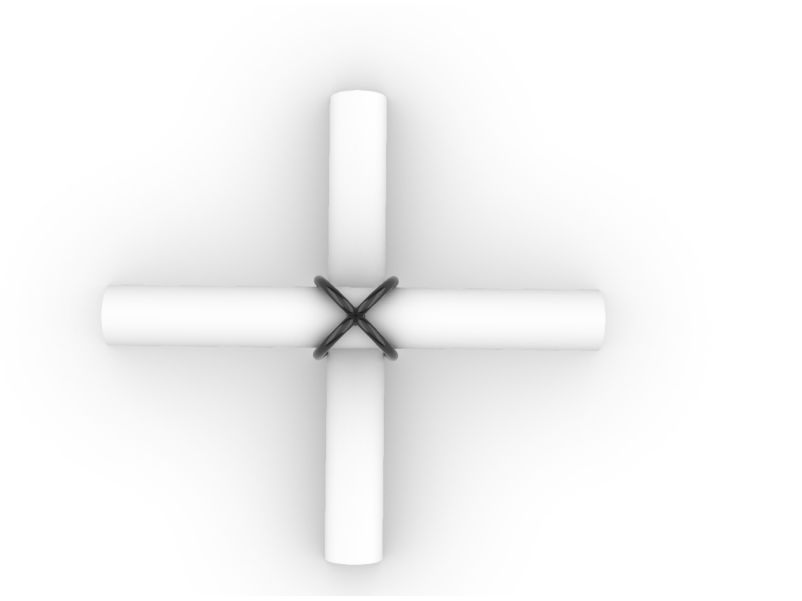






INSPIRED FROM ZIP TIE





SREW AND WASHER JOINERY

ZIP TIE JOINERY

BAMBOO STICK JOINERY

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THANK YOU